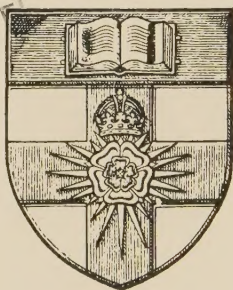


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THE

SURVEYORS' INSTITUTION

(Incorporated by Royal Charter),

12, GREAT GEORGE STREET, WESTMINSTER, S.W.

TRANSACTIONS.

VOL. L.

SESSION 1917-1918.

LONDON:

PUBLISHED AT THE INSTITUTION,

12, GREAT GEORGE STREET, WESTMINSTER, S.W. 1.

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CONTENTS OF VOL. L.

Page.		No. of Paper.	Author of Paper.	Date.
i	Title-page of Vol. L.			
v	List of Officers for 1917-1918.			
1	Opening Address as President .	436	Arthur Lyon Ryde	1917. Nov. 12
29	Agricultural Executive Com- mittees and their Work	437	Harold V. Raffety	Dec. 10
81	The Employment in the Sur- veyors' Profession of Men Disabled in the War	438	L. G. Pilkington	1918, Jan. 14
119	The Taxation, Rating, and Valuation of Mines	439	David Bowen, F.G.S., M.I.M.E., &c., Capt. R.E.	Feb. 25
187	Cost of Building before and after the War	440	Ernest H. Selby	April 8
235	The Metric System in its rela- tion to the Surveyors' Profession	441	A. J. Martin	May 6
299	Annual General Meeting for the Election of Officers for 1918-1919 Report of Council. Accounts, 1917. Obituary Notices. List of Donations and Contribu- tions to the Library.	...		May 27

OFFICERS, 1917-1918.

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GEORGE FRANCIS STEWART (Dublin)

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PERCIVALL CURREY.

Secretary.

ALEXANDER GODDARD, C.B.E.

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Composed of Members of Council and Provincial Chairmen.

BUILDING.
COUNCIL SELECTION.
COUNTY DISTRICTS AND COUNTRY
MEETINGS.
DINNER.
EDUCATION.
ELECTIONS.
FINANCE.

FORESTRY.
LIBRARY AND SESSIONAL PAPERS.
MINING SURVEYORS.
PARLIAMENTARY BILLS AND
GENERAL PURPOSES.
PROFESSIONAL PRACTICE.
QUANTITY SURVEYORS.

Past Presidents.

1868 *John Clutton*
1870 *Richard Hall*
1872 *Edward Norton Clifton*
1874 *Thomas Huskinson*
1876 *Edmund James Smith*
1878 *William Sturge*
1880 *Edward Ryde*
1883 *Thomas Smith-Woolley*
1885 *Edward T'Anson*
1886 *William James Beadel, M.P.*
1888 *Elias Pitts Squarey*
1890 *Robert Collier Driver*
1892 *Charles John Shoppee*
1894 *Thomas Chatfeild Clarke*
1895 DANIEL WATNEY
1897 *Christopher Oakley*
1898 *Robert Vigers*
1899 *Thomas Miller Rickman*

1900 *John Shaw*
1901 SIR JOHN F. L. ROLLESTON
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1905 CHARLES BIDWELL
1906 *George Langridge*
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1908 HOWARD MARTIN
1909 SIR ALEXANDER ROSE STENNING
1910 LESLIE ROBERT VIGERS
1911 W. EDGAR HORNE, M.P.
1912 HON. EDWARD GERALD STRUTT
1913 *W. Edward Woolley*
1914 *Howard Chatfeild Clarke*
1915 JOHN HENRY HANSON
1916 GEORGE FRANCIS STEWART
1917 ARTHUR LYON RYDE

(The names of those deceased are printed in italics.)

The Surveyors' Institution

(INCORPORATED BY ROYAL CHARTER)

Is established—

- (1) To secure the advancement and facilitate the acquisition of that knowledge which constitutes the profession of a Surveyor, viz.—the art of determining the value of all descriptions of landed and house property, and of the various interests therein; the practice of managing and developing estates; and the science of ad-measuring and delineating the physical features of the earth, and of measuring and estimating artificers' work.
- (2) To promote the general interests of the profession, and to maintain and extend its usefulness for the public advantage.

THE INSTITUTION was established in 1868, was incorporated by Royal Charter in 1881, and has a membership of over 4,900.

THE INSTITUTION consists of four classes, viz.: FELLOWS, PROFESSIONAL ASSOCIATES, ASSOCIATES, and HONORARY MEMBERS, with a class of STUDENTS attached.*

A FELLOW must have qualified for that position by having acquired a practical knowledge of surveying in one or other of its branches as above defined, and have held for at least five years a responsible position in the profession; and must have passed the Examinations called for by the Rules of Examination, or some other Examination in the United Kingdom or the Colonies which the Council may declare to be equivalent thereto. § A Fellow has the right, conferred by the Charter, to use the letters F.S.I. after his name. A Fellow has also the right, under By-Laws allowed by H.M. Privy Council, to describe himself as "Chartered Surveyor."

* A class of Probationers was established in 1914. For particulars see last paragraph on page viii.

§ The Council possess only a very limited dispensing power as regards the Examinations.

A PROFESSIONAL ASSOCIATE must be more than twenty-one years of age, a Surveyor by profession, in practice on his own account or employed as an Assistant in a Surveyor's Office, and qualified for the class by having passed the Examinations. A Professional Associate has the right, conferred by the Charter, to use the letters P.A.S.I. after his name. A Professional Associate has also the right, under By-Laws allowed by H.M. Privy Council, to describe himself as "Professional Associate Chartered Surveyor."

AN ASSOCIATE must be more than twenty-one years of age, not a Surveyor by profession, but his pursuits must be such as to qualify him to unite with Surveyors in the advancement of professional knowledge.

AN HONORARY MEMBER must be a person who, either by reason of his position or experience, or his eminence in science, may be enabled to render assistance in promoting the objects of The Institution, but who is not engaged in practice as a Surveyor in Great Britain or Ireland. He has the privilege of being present and taking part at all Ordinary General Meetings, and of access to the Library, but no right of voting, discussing, or otherwise interfering in the affairs of The Institution; nor is he called on to contribute to its funds.

STUDENTS (who must not be under eighteen years of age) qualify as such by passing the Preliminary Examination. Candidates for Studentship who can produce a Certificate of having passed one of the Examinations mentioned in the Rules, are exempted from this Examination, and may be admitted by the Council on the recommendation (according to a form) of a Member of The Institution. Students are expected to enter for the Professional Examinations under the conditions laid down in the Rules of Examination.

A Student is entitled to the use of the Library and Loan Library, to attend the Meetings, and to receive the *Transactions*. For further privileges as to fees and percentage of marks, see paragraphs 10, 11, 12, and 14, of the Rules of Examinations.

Candidates who have passed the Intermediate Examination may connect themselves with The Institution by enrol-

ment as PROBATIONERS on payment of an annual subscription of One Guinea. Probationers are entitled to attend Meetings, to use The Institution buildings, Museum and Library, and to receive the *Transactions*. They can retain the position for three years after passing the Intermediate Examination.

Scholarships open to Students and tenable for three years have been instituted of the value of £80 and £50 per annum. Particulars may be obtained from the Secretary of The Institution.

Any person desirous of being admitted into The Institution (excepting to the class of Students) must be proposed and recommended according to a form, in which the full name and qualifications of the candidate must be distinctly specified. This form must be subscribed by him, and signed by at least six Fellows or four Fellows and two Associates, certifying a practical knowledge of the candidate; or by four Members of the Council, of whom the President shall be one, after careful inquiry into the antecedents of the applicant.

The proposal so made, being delivered to the Secretary, will be submitted to the Council, who, on approving the qualifications, will nominate the candidate for election by ballot.

The following are the rates of contribution to the funds:—

	Annual Subscription.				Admission Fee.		
	£	s.	d.		£	s.	d.
<i>Student</i> . . .	1	1	0	.	—		
<i>Probationer</i> . . .	1	1	0	.	—		
<i>Associate</i> . . .	2	2	0	.	3	3	0
<i>Professional Associate</i>	2	2	0	.	3	3	0
<i>Fellow</i> . . .	3	3	0	.	5	5	0

No person can become a Member (other than an Honorary Member) of The Institution unless and until he pays as his first Subscription to The Institution, in the case of becoming a Fellow of The Institution, the sum of Eight Guineas, in the case of becoming a Professional Associate of The Institution, the sum of Five Guineas, and in the case of becoming an Associate of The Institution, the sum of Five Guineas.

All Fellows, Professional Associates, and Associates are required, within twelve months after their election, to deliver to the Council an original Paper on some subject connected with the profession, or to make a donation to the Library or Collection.

The affairs of The Institution are under the management of a Council, which is elected annually, consisting of a President, four Vice-Presidents, sixteen Fellows, two Professional Associates, and two Associates.

The Session of The Institution commences annually on the second Monday in November, and continues to the end of May. The Ordinary General Meetings are held as far as possible on alternate Mondays during the Session. At these Meetings original communications are read on professional subjects, and their merits fully and freely discussed. Every Member has the privilege of introducing visitors to these Meetings. Members are entitled to a copy of any printed publication issued by The Institution after their admission.

THE OPENING ADDRESS

BY

ARTHUR LYON RYDE (PRESIDENT),

READ AT THE ORDINARY GENERAL MEETING OF

THE SURVEYORS' INSTITUTION,

12TH NOVEMBER, 1917.

It is just thirty-seven years ago since my father, the late Mr. Edward Ryde, first occupied the chair of the President of this Institution, and it is my pleasant duty to express my great appreciation of the honour which you have done me in selecting a second President from the same family. I can only add a hope that I may be able to follow the example of all those who have preceded me, by aiming at the preservation of the highest interests of The Institution and its Members during my year of office, and handing on the traditions of the position unimpaired.

I was in hopes that I should be able to produce at this Meeting a series of letters which passed between various members of the surveyors' profession and my father in the year 1867, in which the possibility of establishing a Surveyors' Institution was discussed. Since these letters were written, however, the firm has been twice compelled to exchange premises, and in the

process the letters have been mislaid. It may, however, interest you to know that the first record of any meeting upon the subject, in the voluminous diary which my father used to keep, appears on the 23rd March, 1868, when a preliminary meeting of surveyors took place at the Westminster Palace Hotel, at which The Institution of Surveyors was formed provisionally. There were present: Mr. John Clutton (in the Chair), Mr. (afterwards Sir) H. A. Hunt, Mr. F. J. Clark, Mr. William Sturge, Mr. John Oakley, Mr. R. C. Driver, Mr. George Trist, Mr. J. Bailey Denton, and Mr. Edward Ryde.

From that time onwards committee meetings took place to which frequent reference is made in the diary, and on the 15th June, 1868, the first Council were elected at a meeting which took place at the Westminster Palace Hotel. Of that first Council none now remain, but that the foundation for which they were responsible was well and truly laid is, I think, shown by the position which The Institution has attained in its nearly fifty years of life; by the building in which we stand, and the manner in which The Institution has met the demands made upon it in time of war; but perhaps, most of all, by the improvement in professional standards and training which has resulted from the establishment of our professional society and its system of examinations.

The first difficulty which usually presents itself to a President of this Institution in connection with his Opening Address is the selection of subjects to be dealt with.

On the present occasion I have not felt this difficulty, because there is one all-absorbing subject which fills the minds of everybody, and that is the war which is at present being carried on between the Central

European powers and the principal civilised nations in the world.

It is not my intention to refer in detail to the effect of the war on The Institution and its Members, as this subject was fully dealt with in the recent Annual Report of the Council. The growing list of distinctions gained by Members in war work of every description, and the lengthening toll of life exacted from among them, bear eloquent witness to the notable manner in which our profession has responded to the country's call. I cannot, however, let this opportunity pass without reminding you that upon those of us, who through age or infirmity are debarred a place in the line of honour, lies a double responsibility. It rests with us, in the first place, to do everything in our power, actively or indirectly, which may further the efforts of our fighting line and may help to bring the war to a successful conclusion; and in the second, to see that, so far as may be possible, the men in our profession who have been fighting their country's battles may not suffer in their professional life on their return.

In my opinion there is nothing we can do which will go further to secure the latter aim than by uniting to keep our professional society the strong, progressive and living entity which it has grown to be since its birth nearly fifty years ago.

I recognise the difficulty of continuing, among the clash of interests and the abnormal pressure caused by war, activities which seemed closely to concern us in happier times; but I do wish to impress upon Members, both in London and in the provinces, the importance of continuing their meetings and discussions upon professional subjects, and, even more so, the desirability of their publicly taking part, as Members of The Institu-

tion, in the endeavour to solve the many weighty questions connected with food supply, housing, &c., upon which their technical knowledge should enable them to speak with special authority. If surveyors grasp their opportunity, and give reason for the public and the public authorities to recognise their right to advise on these questions, and their impartiality in doing so, it cannot but strengthen the position of our profession and prove to the advantage of its Members at the termination of the war.

There is, however, a subject which falls legitimately within the province of a surveyor, and especially of a rating surveyor, viz., the present and future effect of the war upon the value of property generally in the British Isles. This, therefore, will be the first subject to which I will direct your attention.

I have endeavoured to arrive at some conclusion thereon by a consideration of the returns available, giving the totals of the gross and rateable values in the valuation lists of the several parishes in the administrative county of London. Of course London is not the whole of the British Isles, but in considering the effect of the war on the value of property in the metropolis, I think that we may gain a very fair impression of what may generally be expected in other parts of the country.

There are certain properties which have been affected in very special ways, which I will endeavour to deal with later on.

For the moment I confine my attention to the effect of the war upon the total value of property in the administrative county of London. This is what the returns show.

Total assessable value of the property within the

county, being the rateable value of the parishes, reduced by one-half of the rateable value of agricultural land :—

		£
Year ending 6th April, 1912	...	44,774,038
" " 1913	...	45,015,238
" " 1914	...	45,112,481
" " 1915	...	45,252,412
" " 1916	...	45,220,740
" " 1917	...	45,320,743

Having regard to the fact that the war commenced on the 4th August, 1914, the first thing that strikes anyone in connection with these figures is the remarkable stability of the value.

It will be seen that while the figure representing millions is absolutely stationary, the figures following represent a slight but steady increase, with only one setback. The latter is easily explained by the occurrence of the Quinquennial Re-assessment in the metropolis in the year 1915, the effect of which is shown in the figures given for April, 1916.

It is well known to rating surveyors that during the revision in question immense reductions were made in the rateable values of all properties having to depend upon an industry requiring a consumption of large quantities of coal, *e.g.*, gasworks and electric light works obtained very substantial reductions on their assessments, amounting in the case of the largest property (that of the Gas Light and Coke Company) to the enormous figure of £104,632.

There was also, as is well known, a great reduction in the assessment of all licensed properties, the latter being greatly affected by the course of legislation during

the last few years. The special causes which affected the value of licensed properties were as follows:—

- (1) The increased beer duty which took effect in the middle of November, 1914;
- (2) The limitation of trading hours;
- (3) The prospect of an Act being passed to restrict the output of beer.

In spite of these facts the reduction in the total rateable value amounted roughly to only £32,000, and the total has since shown a tendency to increase as before.

In case it may be thought that the total rateable value of the metropolis has been kept up by growth in the suburbs, it may be as well to quote the figures of the cities of London and Westminster for the same years. These areas are, of course, filled up, so that it cannot be alleged that the growth in value is due to expansion of the area built over.

The figures are as follows:—

					City of London.	City of Westminster.
Total Rateable Value shown in Valuation Lists and Supplemental Lists 1912					£	£
do.	do.	...	...	1913	5,759,323	6,619,069
do.	do.	...	...	1914	5,758,401	6,682,238
do.	do.	...	...	1915	5,798,001	6,838,937
do.	do.	...	...	1916	5,830,988	6,869,981
do.	do.	...	...	1917	5,860,812	6,934,296

It will be seen that the rateable value shows practically a steady increase throughout.

I have purposely included six years in the above

tables in order to be able to compare the year ending 6th April, 1917, with the fifth year back. It will be seen that the figures show a substantial increase.

In my judgment the stability of these figures is a substantial corroboration of the view that the war will not damage property in Great Britain to anything like the same extent as that in France, Russia, Italy, Germany, or Austria. It is, of course, quite impossible to obtain access to figures showing the taxable value of property in enemy countries, but having regard to the temporary extinction of the external trade of the Central Empires, it is practically certain that the same stability cannot exist there.

In considering the effect of the war upon various large types of property, the first which occurs to me is that of the railways.

In this case the arrangement made between the Government and the various railway companies precludes any possibility of demonstrating the annual value of the railways. Members will not require to be reminded that the principle of the arrangement was that the Government should guarantee to the railway companies the same net receipts as they enjoyed in the year 1913, and that they (the Government) should take over the management of the railways for the period of the war.

Immense numbers of troops and an immense tonnage of munitions have been conveyed to and fro without any charge being made by the companies against the Government for their conveyance. It is, I believe, common knowledge that if the railway companies had been allowed to charge for this conveyance at the same rate as they were charging before the war commenced there would have been an enormous increase in the gross

receipts of the lines; and from this point of view the arrangement made by the Government appears to me to have been a remarkably economical and sensible one for the country, as the Government are in fact only paying for such conveyance as they require—practically the actual cost price of the work done.

It must not be supposed, however, that the railway companies' net receipts would have corresponded with the increase in the gross receipts.

The Government have found it necessary on several occasions to agree with the trades unions and concede increases in wages which were stated by Sir Albert Stanley in the House of Commons on the 15th August last to represent an additional working expense of £25,000,000 per annum.

I do not propose to follow up this subject, which is only indirectly connected with the surveyor's profession, except to express the opinion that at the end of the war very exceptional arrangements will have to be made by the Government if the present dividends are to be continued payable on the ordinary stock of English railways. In this connection it should be stated that the railway returns for 1913 give the dividends payable in the United Kingdom (*a*) on guaranteed and preference stock at £17,239,026, and (*b*) on the ordinary stock at £17,704,982; so that the dividends on the ordinary stock would be entirely extinguished, and a large part of those on the guaranteed and preference stocks also, were there no increase in income to counterbalance the enormous increase in working expenses.

I further express the opinion that in any event the rateable value of railways, as a whole, must be considerably reduced. At the present time the companies are paying roughly upon the assessments in force at the

commencement of the war, and I believe that there will be no difficulty in showing that some of these are, in present circumstances, very much above the mark.

With regard to the rateable value of gasworks, this was already greatly affected by the gradual increase in the price of coal before the war, and the effect of the war was enormously to increase the cost of the raw material in consequence of the rise in the cost of freight.

The Gas Light and Coke Company used in the course of the year 1913 about 2,000,000 tons of coal, most of which came from the Newcastle district, at a freight of about 3s. per ton. In a very short time the operations of the Germans had the effect of running up the cost of freight by about 10s. per ton, so that the increase to this one company amounted to about £1,000,000 per annum—a sum which is sufficient to upset all calculations, and to render it extremely difficult to make both ends meet.

The gas companies, however, have two sources of income which furnish a strong recuperative power. They are:—

- (a) The power to raise the price of gas; and
- (b) The price of coke and other residual products, which always has a tendency to rise in sympathy with the price of coal.

It is, of course, the fact that the effect of raising the price of gas is to reduce the consumption, but, in spite of this fact, the power to raise the price of gas, within limits, has an immense effect in giving stability to the annual value of gasworks. It must not be forgotten also that the various companies are manufacturing explosives for the Government in large quantities.

In these circumstances the effect of the war upon the annual value of gasworks is not so easy to define as it is in the case of railways, but it has undoubtedly reduced the value substantially.

With regard to the effect of the war upon house property, from the figures given above, it is obvious that there is no great slump taking place in London, and it is, I believe, the fact that if the aggregate value of houses of the value of £150 per annum and downwards could be ascertained, it could be shown that there is no falling off in the annual value of the property.

On the other hand, there is undoubtedly a considerable reduction in the annual value of large residential properties, both in London and the country. Quite apart from the expense of keeping up such properties, there has been an emigration of the occupiers into much smaller houses, a process which can be said to have taken place all down the scale. The result has been to keep up the value of small houses at the expense of the large.

I may add that the almost total cessation of building has had the effect of checking the growth of the supply of houses, and in spite of the enormous withdrawal of men for service abroad, there is a great demand for small houses and cottages all over the country. It is well known that in the neighbourhood of the large munition works which have recently been established, the absence of housing accommodation has almost amounted to a scandal, and even in the smaller towns the effect has been to increase the amount of overcrowding in the smaller houses to a very objectionable extent.

In this connection it may be mentioned that as a sequel to their recent Report on House Emergency

Schemes for the purpose of providing Employment after the War, the Housing Committee were desired by the Council on the 11th December, 1916, to extend their inquiry to the causes which had given rise to the shortage of house accommodation for the working classes. The terms of the reference were:—

“To consider and report to the Council as to the
“factors which in England and Wales have been
“mainly instrumental in checking the erection of
“houses for the working classes.”

The Report of the Committee has quite recently been published, and I strongly recommend you to read it. It contains a great deal of valuable information on the various factors which have affected the cost of building during recent years, as well as on those which have tended to turn the flow of capital into directions other than the erection of working-class dwellings.

Had it not been for the Committee's Report and the exhaustive manner in which the whole subject is there treated, its urgency would have made it incumbent upon me to devote a considerable part of my Address to its discussion. In the circumstances, however, I feel that it would be superfluous for me to attempt to enlarge upon the Report, beyond calling your attention to the magnitude of the subject, as evidenced by the fact that the normal increase in the population as shown by the Census requires the erection of, approximately, 76,000 additional houses per annum, or about 100,000 in all, if those worn out, destroyed, or used for other purposes, are also brought into the calculation; whereas only about 60 per cent. of those required were built during the five years ending with 1915. I have no doubt that the existing acknowledged shortage will develop into a

perfect famine of small houses when our men return from the war unless energetic measures are at once taken to provide more accommodation.

I must not omit to refer to the effect of the war upon the value of agricultural land. I believe that I am correct in saying that it is the opinion of all surveyors that small farms, and agricultural land generally, are selling better now than they have done for the last twenty years. It is true that we have not got back to the prices which were common in the good times of the seventies, and the majority of purchasers buy for occupation to farm the land, there being little tendency to buy agricultural land as an investment. On the other hand, the occupying owners of farms are frequently known to buy adjoining farms, which, in itself, is a good sign, as the occupying farmer knows the value of land as well as anybody.

It would be impossible for the Opening Address of the President of an Institution, the Members of which are so closely concerned in the management of large areas of agricultural land, not to touch in some detail upon a measure which has recently been placed upon the Statute Book, and which presages a complete departure from the *laissez faire* attitude with regard to agriculture which has prevailed in this country since the repeal of the Corn Laws in 1846: I refer, of course, to the Corn Production Act, which received the Royal Assent last session.

Although I do not presume to pose as an agricultural expert, there is some truth in the saying that lookers-on see most of the game; and it is possible that a surveyor like myself, who had many opportunities of obtaining a practical insight into farming problems on land farmed by his father, and whose business now takes him into

many rural districts, and brings him into touch with those intimately connected with the management and cultivation of land, may not be altogether unfitted to form an impartial opinion as to the advantages and disadvantages of the change in national policy indicated by the passing of this measure. I propose, indeed, to deal with the question of policy rather than with the actual provisions of the Act itself.

I purposely abstain from myself offering an opinion as to whether the provisions of this particular measure will best attain the objects desired by those responsible for its introduction, because I think that when an Act is placed upon the Statute Book such discussions are worse than useless. There is, however, no doubt in my mind that something was needed to induce a much more general cultivation of arable land for the purpose of increasing the food supply; and although opinions may differ with regard to the Corn Production Act, it is difficult at the present time to suggest a more effective way of encouraging this tendency than that adopted. It should not be forgotten that the Act in its present form was introduced as a temporary measure to meet a war emergency.

In the first place I must ask you to accompany me back through the pages of history, and very shortly to trace the causes which have led up to the present position.

At the time of our last great war, a hundred years ago, the Government was not faced with one of the great problems which has to be met by our legislators of to-day; the country was practically self-supporting in foodstuffs, and any temporary difficulties which might arise were provided for by the many enactments of that period dealing with the export and import of

corn. Political power was almost entirely in the hands of the land-owning and agricultural classes, and the policy of "Speed the plough" was the accepted line of conduct adopted by both political parties.

The immense development of industry and commerce which, with occasional sets back, followed the conclusion of peace, and which resulted in great increases in the industrial population of the manufacturing districts, gave rise to a new objective on the part of a large part of the community. The artisan was ready to favour legislation which would cheapen food, and the manufacturer was prepared to support a movement which would enable him to obtain the labour employed in his works at as cheap a rate as possible. The Manchester school of thought came into being.

By the Reform Act, 1832, the great change in political power was effected. Although, perhaps, not at first recognised, its effect upon the future of agriculture in this country was to be far-reaching. In 1846 the Corn Laws were repealed, and the first great fight between agriculture and manufactures had resulted in a victory for the growing masses. Even so, the effect upon the food producers would not have proved so momentous had conditions otherwise remained unchanged; but the discovery of the possibilities of steam, and the rapid development of railways and steamship transit which followed, opened out a competition with the home grower which entirely altered his position. Prior to this the farmer had usually received compensation for a bad crop in high prices, but in future the sea-borne produce of the world, coming from districts which might have enjoyed a bounteous harvest, were to compete with him in the home market.

A comparison of the figures showing the acreage

under wheat, and the wheat grown and imported in 1860—at the height of the railway boom—with those of 1914, is instructive.

Year.			Acreage grown.	Home Grown.	Wheat and Flour imported.	Percentage of Home Grown.
			Acres.	Quarters.	Quarters.	
1860	...	...	4,019,725*	13,135,124	7,364,439	64·1
1914	...	...	1,904,932	7,804,041	27,509,831	22·1

* Estimated by Gilbert and Laws.

The policy that the land of the kingdom should be mainly instrumental in providing the food required for the sustenance of its population was definitely abandoned, and the country began to look more and more to supplies from overseas to make good the deficiencies of the home supply. The effect upon prices was marked, the average price of wheat falling from 64s. 3d. in 1830 to 26s. 11d. in 1900, while barley, oats, meat, and wool, also showed a marked depreciation in value. The disastrous period which commenced with the wet seasons of the late seventies and culminated with the acme of competition experienced in the early nineties, when prices touched their lowest point, resulted in widespread ruin among farmers. Their industry was no longer necessary to their country; the Navy, even in time of war, could command the seas and ensure a plentiful supply of food for the teeming population; provided that food was cheap the industrial community were no longer concerned in the prosperity of agriculture; and there seemed nothing for the farmer to do but so to change his methods as to ensure a small but reasonably safe return with as little expenditure as possible. This he did with considerable success, so that

for ten years prior to the outbreak of war agriculturists, as individuals, enjoyed a fair measure of prosperity. But it does not necessarily follow that methods which may prove advantageous to the farmer will of necessity be equally beneficial to the food supply of the community. In the circumstances the farmer was doubtless wise in playing for safety, and the State which had neglected him could not blame him for so doing.

The result was that between 1870 and 1914 the land under the plough in the United Kingdom diminished by over four and a half million acres, and the number of persons engaged in agriculture by over one and a half millions. In spite of the advance of science, improvements in machinery and stock, and an increase in the use of concentrated feeding stuffs, the total amount of food produced in the country was infinitely less than had been the case fifty years earlier.

Such was the position at the commencement of hostilities, nor, apart from the effect of imports upon our financial position, did it, at first, seem likely seriously to affect our liability to prosecute the war unhampered by difficulties in connection with the national food supply. Our fleet speedily cleared the seas of hostile craft, and, except for some increase in prices, due to the enhanced freights which followed the commandeering of a considerable proportion of the mercantile marine for military purposes, there seemed no reason to anticipate any special difficulties in this direction.

The weakness of our position, however, soon became apparent. In the first place, the increased demands upon the world's food supply by the armies in the field, coupled with a diminution in that supply, due to the devastation of the fighting areas and poor harvests in

other parts of the world, made themselves felt; and in the second place, the power of the submarine, at first not fully recognised, began to exercise a still more potent influence.

While not wishing in any way to appear an alarmist, I am strongly of opinion that the submarine menace cannot be neglected in considering the agricultural position of a great insular power such as our own. The monthly returns of the losses in our mercantile marine make it clear that, in spite of the efforts of our Navy, no sure and decisive parry to an attack in this direction has yet been devised; and although I do not fear the ultimate result upon the present war, I am strongly of opinion that our national security demands the abandonment of the *laissez faire* attitude with regard to agriculture, which has so long prevailed, in favour of a policy which will result in better use being made of our fertile lands and a far larger proportion of our food supply being produced at home.

The responsibility for carrying out such a policy will fall upon our agriculturists, but the nation cannot escape its share of the responsibility. It cannot ask the farmer to put more capital into his business, to spend more on labour, manures, and feeding stuffs, and to exchange the conservative methods which have brought him a reasonable and fairly safe return during the past ten years, for systems of farming entailing far greater risk of loss, without protecting him against such a break in prices as caused the widespread ruin of the last quarter of the nineteenth century. The passing of the Corn Production Act is a proof that the Government recognise this responsibility. As a measure it has been subjected to much adverse criticism, and doubtless time will show

how best it can be amended, but I venture to assert that considerations of national security prevent our listening to those who state that farmers only wish to be left alone, and who deprecate any attempt to improve our agricultural methods by legislation. Denmark, Holland, and Belgium before the war have demonstrated that Great Britain no longer holds supremacy in agriculture, while Mr. T. H. Middleton's classic pamphlet on *The Recent Development of German Agriculture* (Cd. 8305), showing what may be done in a country possessing neither the fertility of soil nor the climatic advantages of our own, merits the close study of all interested in this subject.

I do not propose to discuss in detail the provisions of the Corn Production Act, but it may be of service if I indicate briefly the direction of this initial attempt to supervise home agriculture.

The Act is divided into four main parts: Part I. lays down minimum prices for wheat and oats up to 1922; Part II. provides for the payment of a minimum wage to agricultural labourers; Part III. places a conditional restriction on the raising of agricultural rents; and Part IV. gives the Government power to enforce proper cultivation.

Dealing with these in order, Part I. is an attempt by the Government to meet the responsibility which must necessarily be accepted by the nation if it demands from the agriculturist a change in his system of farming entailing greater risk of loss. Minimum prices are laid down, varying in the case of wheat from 60s. per quarter in 1917 to 45s. a quarter in 1922, and for oats from 38s. 6d. per quarter to 24s.; and should the average price as ascertained under the Corn Returns Act, 1882, fall below the minimum price thus laid down in the Act,

the grower may claim from the Board of Agriculture a sum equal in the case of wheat to four times, and in the case of oats to five times, the difference between the average price and the minimum price in respect of each acre respectively of wheat or oats produced. Thus should the average price of wheat fall to 42s. in 1922, for which year the minimum price laid down is 45s., there would be a difference of 3s., and growers of wheat would be entitled to claim four times 3s.=12s. for each acre grown. It is noticeable that the recommendation made by Mr. Edwin Savill in his Paper read before The Institution in 1914 has been followed, the payment being made not on the price received by the individual farmer, but on the difference between the minimum price laid down by the Act and the *average* price for the year.

The method adopted by the Act of dealing with the matter is open to the criticism that the payment is made, not on the wheat actually produced, as was at first proposed, but on the acreage basis, and that the grower of a poor crop would therefore stand to benefit to a greater degree proportionately than the more intensive farmer. It cannot be denied that there is much force in this contention, but, on the other hand, there is something to be said in favour of the Act as drafted, in that it offers the greatest encouragement to those who need it most—the occupiers of the less fertile lands—and greatly simplifies the machinery for checking the claims, if any, which may be made. Some may be inclined to think that the minimum prices laid down are of so conservative a nature that there is little risk of the country being called upon to meet any claims under Part I. of the Act. At the same time they do guarantee to the farmer that a fall to the level of the

unproductive prices which prevailed prior to the war cannot take place during the six years the Act remains in operation. Whether, however, a six years' guarantee will prove sufficient to restore confidence to farmers, and to induce them to embark upon any considerable additional expenditure, is open to grave doubt.

Under Part II. of the Act an attempt is made to ensure that the labour necessary to enable the object of Part I. to be secured is forthcoming. A minimum rate of 25s. per week for agricultural wages is laid down, and Wages Boards are to be established to deal with such questions as the monetary value of allowances, the employment of labourers outside the classification of able-bodied men, and the minimum rates to prevail in districts where a standard of wage in excess of 25s. a week is looked upon as necessary. Here I could have wished that a weight might have been attached to the simplification of machinery equal to that which was given to similar considerations under Part I. of the Act. Higher waged labour has never shown itself either diffident about or unequal to making its own bargain as to wages, and had a general flat rate of 25s. a week been laid down, the work of the Wages Boards would have been greatly simplified.

Before leaving Part II. I should like to say one word on the connection between the subject of wages and the rural housing question. The Special Committee of The Institution, whose Report issued twelve months ago roused such widespread interest, drew attention to the check upon building attaching to the common custom of letting rural cottages at altogether unremunerative rents, and recommended that owners of cottages should take such opportunities as might offer of fixing rents at the lettable value. It is true that many landowners

might shrink from the odium attaching to a general raising of cottage rents, but in the end the labourer would benefit by both additional and improved accommodation. The large increase in agricultural wages brought about by Part II. offers such an opportunity of putting rents on an economic basis as may never again occur, and it is to be hoped that it may be widely used.

It is interesting to note that the Special Housing Committee, to whose valuable Report I have already referred, confirm the recommendations made by the Rural Committee twelve months ago. Experienced opinion generally appears to have come round to the view that the custom of letting agricultural labourers' cottages at rents below their proper lettable value is open to both economic and social objections which make it desirable that owners, agents and farmers should seize every opportunity of putting the question on a more satisfactory and systematic basis.

Part III. provides that the rent payable in respect of an agricultural holding under any contract of tenancy made or varied after the passing of the Act shall, notwithstanding any agreement to the contrary, not exceed such rent as could have been obtained if the minimum prices laid down in Part I. had not been in force. It will be seen that no restriction is imposed on the raising of agricultural rents where land is under-rented, the prohibition merely applying to cases where the ability to realise a higher rent is based upon the fact that the return obtained from the sale of wheat and oats produced on the land in question cannot fall below the minimum prices laid down in Part I. Such a provision is a natural corollary to the guarantee of price, which is given with the sole object of securing an increase in the

amount of wheat and oats grown. Were it possible for a third party to obtain a share of the inducement thus offered, the inducement would be *pro tanto* reduced, and the likelihood of the object being attained would be proportionately lessened.

Part IV. must also be looked upon as complementary to Part I., the attitude taken up by the Government evidently being that if the nation undertakes to free the grower from the risk of a break in prices, they are justified in calling upon him to put his land to the best possible use, and to provide the utmost amount of food for home consumption. They, therefore, take upon themselves the power to enforce proper cultivation, and even to evict a farmer who fails to come up to the standard they require, and to enter upon the land themselves. This Part of the Act obviously bristles with difficulties, and it would need a bolder man than I feel myself to be to prophesy what its effect may be. In theory the deduction would appear sound, but success in carrying it to its logical conclusion must depend entirely upon the manner in which it is carried out. The efforts of the County Executive Committees in this direction have shown how difficult is the problem, and the most consummate tact, combined with the widest agricultural knowledge, will be required if this Part of the Act is to have the result desired by the Legislature. I feel that every person qualified by experience to speak upon the subject would urge them to adopt as their text in this matter the old Latin catchword *Festina lente*.

I cannot close my Address without expressing my sense of the great loss suffered by the Council and The Institution generally in the death of our recent President, Mr. Howard Chatfield Clarke. It is not too much to say that there was no more popular member of the

profession, as he possessed in an eminent degree the qualities of judgment, even-temper, impartiality and charm of manner. It is rarely that these qualities are so happily combined as they were in the case of Mr. Howard Chatfeild Clarke, and the Council all feel that they have lost a personal friend.

Mr. LESLIE VIGERS (Past-President) said it was his pleasure that evening to propose a very hearty vote of thanks to the President for his able Address. He had known Mr. Ryde for a great number of years. In fact, it was as long ago as 1874 to 1876 that they both used to meet at the little court where the Middlesex County Hall now stood, both engaged in taking notes of the cases which were then proceeding in consequence of the second quinquennial period, 1875-6. Personally he had always found Mr. Ryde not only a straight antagonist, but a most cordial supporter—one of those men with whom you could discuss your own case freely, who, even when he did not agree, could be relied on not to take advantage at a later period of a confidential conversation, which showed that Mr. Ryde was the type of man The Institution wanted as their head.

His Presidential Address had been most interesting. The facts, figures, and observations put before them by the President on the question of the probable value of property after the war would give them a sound basis from which to consider that problem, and when they left the meeting that night they would take away with them a great deal to think over.

With regard to the part of the Address in which the President had referred to agricultural questions, there was much in it with which he could agree, and also a great deal which would require careful consideration.

It was not a custom of The Institution to discuss the President's Address in detail, and, therefore, before resuming his seat, he only wished to say how sincerely he desired to associate himself with Mr. Ryde's remarks concerning Mr. Howard Chatfeild Clarke, who was one of his oldest friends, and in whose lamented death The Institution had lost a great supporter.

Mr. J. H. OAKLEY (Vice-President) said he cordially seconded the vote of thanks and entirely agreed with Mr. Vigers in his comments. Although not in quite such close professional touch with the President as Mr. Vigers or some other Members of The Institution, he had always felt, in his association with him, exactly what Mr. Vigers had described.

The only remarks he had to make in regard to the President's Address were in connection with the agricultural question. The President commenced by limiting his qualifications. They would, however, agree that Mr. Ryde need not have done so, and that he had given them a general and practical statement as to this country's present position as regards both agriculture and food production. In his opening remarks Mr. Ryde referred to the fact that many Members of The Institution were debarred either by age or circumstances from joining what was so rightly called the "line of honour," and had pointed out that it was incumbent on them to do their utmost to assist that line of honour in every way possible. They would agree with him that there was no more important direction in which assistance could be given than by supporting in every way the efforts now being made to foster agriculture and increase the country's food supplies from home-grown sources. As they all knew, the tendency for some time past, and he regretted

to say it, both in legislative and political quarters, had been to belittle agriculture, and he might add landowners, or at any rate to do very little for them.

There had recently, however, been very marked changes brought about by the war, as shown by legislation, and the expressed opinions of Ministers, of some of whom one could hardly have believed that they held the opinions they had expressed before the war. There must be continued improvement in this direction, for the country had not only now but in the future to depend on their own agriculture for the production of food to a far greater extent than ever before, and food production, at the moment, was the centre of the question. It must not be forgotten that the Corn Production Act was emergency legislation, and that it had been adopted in extraordinary circumstances. He thought they would agree that in the drafting of the Bill the best practical brains were consulted, and that generally everything was done to meet a great national difficulty. He could say with confidence that, so far as that important measure was concerned, The Institution gave every assistance they could, both by considering the provisions of the Bill, and the many points that arose in connection with it. Those, it seemed to him, were sound reasons for claiming that; they supported the line of honour if they did all that was possible to further the improvement of agriculture and to increase the food production.

It gave him great pleasure to be allowed to second the vote of thanks, and to wish the President good health to enable him to fulfil his year of office. Mr. Ryde's presidential term had not come at a time that anyone would select for his term of office, but none the less, there were matters of far greater importance and

urgency needing attention than in normal times of peace, which were, perhaps, more socially attractive.

Mr. R. M. D. SANDERS (Fellow) desired to associate himself with the vote of thanks, especially as coming from agriculturists. The Institution was extremely fortunate in having Mr. Ryde at its head during the coming year, which no doubt would be a period of great and serious crisis in the history of our country. The President had mentioned the early days of The Institution, and the speaker remembered very well how, some twenty-two years ago, he had come over with friends in Ireland at the time of the most pleasant associations, viz., when The Institution extended its sphere of action to the other island. The benefit to Ireland of that arrangement had been very great; it had brought those concerned in the management of Irish land into close connection with those concerned in the management of English land and agriculture. The result had been beneficial both to members of the profession, and, what was more important than anything else, to the public also. It was largely through the assistance and wise counsel received from The Institution that the land question, which was settled on the basis of freehold occupation, was carried out without very much friction. Though that, he was sorry to say, was not quite completed when Mr. Wyndham left Ireland, it was not the fault of The Institution or of its Members in Ireland.

In the future he was sure the country would continue to gain by such interesting records and advice as were contained in the President's Address, not only on the questions of agriculture in England, but also in Ireland, where, in many respects, it was even a more important

question than here, because in Ireland they had very rich and productive land, which was to a large extent undeveloped; at any rate, it had not been brought to the same development as in England. During the last twelve months, he was glad to say, greatly increased cultivation and production had been achieved, and this was still increasing. Of the many difficulties with which they had to contend over in Ireland, there was that little piece of water which separated them from Great Britain, and affected transport and various other things, but he was sure that any help and advice that could be given to agriculturists in Ireland would be very well repaid, and would prove to be of national importance.

He looked with great confidence to the effect of the President's remarks on one point, *e.g.*, *laissez faire*. That, he ventured to say from his own experience, was the policy which had created all the trouble in the other island, but it was not a policy likely to hold in the future. He looked forward to the change, certain of the fact that they would ultimately obtain a greatly increased production and get a great deal more from the land than they had ever been able to obtain in the past.

Mr. LESLIE VIGERS having put the vote of thanks to the meeting, which was carried with acclamation,

The PRESIDENT thanked the Members of The Institution very heartily for the cordial manner in which they had received his Address. Though it gave him a great deal of trouble to prepare, it was, at the same time, a pleasure. There were some points in it, perhaps, on which they might not agree with him, but he would then refer to only one sentence, *i.e.*, "I purposely abstain
"from myself offering an opinion as to whether the

“provisions of this particular measure will best attain the objects desired by those responsible for its introduction,” which, he thought, would make it clear that although he had given some particulars about the Corn Production Act, he did not intend them to understand that he looked upon the measure as incapable of improvement. It was not his intention to express an opinion one way or the other.

He was extremely glad to hear of the improved prospects for the future in Ireland, and he was much obliged to Mr. Sanders for his remarks, and he also desired to thank both Mr. Vigers and Mr. Oakley, who had so kindly proposed and seconded the vote of thanks.

The SECRETARY announced that Mr. Salter, K.C., Associate Member of the Council, had recently been elevated to the Bench, and at the Council Meeting immediately preceding this meeting it had been decided to recommend that Mr. Justice Salter be elected a Honorary Member, in place of an Associate, of The Institution.

This being put to the meeting, was agreed to unanimously.

The SECRETARY further said he was sorry to announce that, owing to the scarcity, it has been impossible to obtain the necessary supplies of tea, sugar, &c., for the light refreshments hitherto provided in the Hall after these meetings. It was a matter he much regretted, as the few moments that were generally spent in taking such refreshments gave an opportunity to Members for meeting and conversation with one another that had hitherto formed a very pleasant ending to these meetings.

AGRICULTURAL EXECUTIVE COMMITTEES AND THEIR WORK.

By HAROLD V. RAFFETY (FELLOW), O.B.E.

*Read at the Ordinary General Meeting of THE SURVEYORS'
INSTITUTION, held on Monday, 10th December, 1917.*

ARTHUR LYON RYDE (President) in the Chair.

It was with great pleasure that I accepted the kind invitation of The Institution to write a Paper on "Agricultural Executive Committees and their Work." I had some natural hesitation in dealing with so important a subject. This was overcome, however, by the fact that my desire is quite as much to elicit from others the benefits of the knowledge that they must have acquired in similar positions, as to give any results of the experience I may have gained from membership of one of these committees.

I feel that no apology is needed for introducing this subject. In my opinion the constitution, powers and work of the committees are bound to be of the utmost importance to the whole body, or at least the whole of the country Members, of this Institution. Early in the year the question of food supply, especially during the months before the harvest, assumed a position of the most pressing national importance. The submarine

menace wore at that time its most threatening aspect, and it was in these circumstances that the committees commenced their great work. I feel I cannot do better than quote a letter from the Prime Minister to a gentleman who was approached to take up the position of chairman of one of these committees. It is the most weighty evidence of the importance of their task. The letter is as follows :—

“ SIR,

Sir Arthur Lee has referred to me, as a question of principle, the doubt which you feel as to whether you would be justified in giving up responsible work as chairman or member of important county committees in order to place your services unreservedly at the disposal of the executive of your War Agricultural Committee. In view of the grave perils which threaten our food supply at the present time, there is no other kind of county work which could compare, either in importance or urgency, with the campaign for increased food production. I therefore have no hesitation in appealing to you, and others in your position, to set everything else aside, if necessary, in order to devote your whole energies to this vital and urgent task.

Yours faithfully,

D. LLOYD GEORGE.”

Time passes very quickly in these days, and it is in some way hard to believe that these committees have been in active operation now for a period of nearly twelve months. I feel that we shall all agree that, however much time and attention we may have been able to give to their meetings, there is still much that can be done to improve the methods by which we are working.

If we exclude the actual farmers themselves, I suppose there is no body of men with the power to do more

to assist the great scheme of which these committees form a part than the Members of this Institution.

Any claim I may have to speak on this subject must rest on the fact that I have been a member of one of these committees practically since its inception. It will be understood that my remarks are based entirely upon this experience, while any opinions expressed are personal to myself. I should like to add, however, that I feel something of an enthusiast in the desire to assist the working and development of a scheme which, I believe, has almost unlimited possibilities for the good of agriculture and the country.

Now first as to what these committees really are. Many of the members of our profession, if not all, know full well and are intimately connected with their composition and powers. I think, however, there are still others, both of this profession and the agricultural community generally, who know little or nothing about them. I noticed a remark in a paper the other day that, unlike most wartime innovations, those committees had not been boomed. Well, it is not always the most boomed institutions that do the greatest amount of good work. These committees were formed for work, and work only, downright hard work of a definite and defined nature; and so far as my experience goes their whole attention has been confined to this.

Briefly, these committees are bodies of practical agriculturists with a leavening of others who are sufficiently interested in agriculture to devote their time and attention to the more general business and organisation side which is inseparable from so large an undertaking. It is in connection with this latter part of the work that I have been mainly interested personally. For the first time the agriculturist in the remotest parish is brought

into direct touch, through his district and executive committee, with the great Government department which has his special welfare at heart.

The one outstanding object for which the committees have been brought into being is to increase the home-grown food supply of this country. How important this task really is no words of mine can explain. The following extract from a letter dated as recently as November 5th, signed by the President of the Board of Agriculture and the Director-General of Food Production, must, however, bring the serious nature of the whole question home to every one of us:—

“If we are to secure food for the people of this country, greater and more prolonged efforts are required. A new danger has slowly risen into prominence, and, unless it is arrested, it may develop with fatal rapidity. Under the pressure of war, Europe is fast declining in productive power. In other countries on which we rely for food, man-power is too reduced to enable them to increase production so as to make good the deficiency. Whether the submarine menace is overcome or not, whether peace is won or war prolonged, makes little difference. We are threatened with a shortage of food throughout the world, and not in 1918 only, but in 1919 and 1920. We can no longer expect to obtain from abroad the quantities of bread and meat by which we have been accustomed to sustain life at home. If we do not feed ourselves, no other country can or will. To what extent we shall be short of food, depends on the extent of our success or failure in increasing our home-grown supplies.”

Surely nothing further on this point can or need be said.

In September, 1915, a circular letter was sent from the Board of Agriculture directing that each county council should appoint a War Agricultural Committee

for the county. In Buckinghamshire the Agricultural Instruction Committee formed the basis. Members representing agriculture in various parts of the county were co-opted upon the new War Agricultural Committee, and shortly after this district committees for each rural district were set up. In January, 1917, under the Cultivation of Lands Order, 1917, made by the Board of Agriculture and Fisheries under Regulation 2M of the Defence of the Realm Act, the War Agricultural Committees were directed to appoint out of their members an executive committee consisting of not less than four nor more than seven members (unless the Board otherwise directed), and of such additional members as the Board might appoint. This Order marked the birth of the executive committees, and, as subsequently amended by that of March 15th, 1917, is in reality the charter under which their work is being carried out. While it is provided that the executive committee shall from time to time report their proceedings to the main body, it is expressly stated that the acts of the committee shall not be subject to confirmation by that body. It must be borne in mind, therefore, that it is the executive and not the main committee in whom the powers are vested.

In my county the membership of the executive is eight, with the addition of the Board of Agriculture commissioner. Five of the members are practical tenant farmers. The desirability of increasing the number of the members has often been discussed, but it is interesting to note, as showing the advantages of a small number of members concentrated upon a task, that on no single occasion has work been rendered impossible by the lack of a quorum. During most of the time the meetings of the committee, apart from

sub-committees, have been regularly held three days a week.

Having once realised that the one and all-embracing reason for the existence of these committees is the increase of the home-grown food supply, it is necessary to examine the methods and powers under which this work is being carried out. These powers are far-reaching, indeed, though not, in my opinion, any too wide for the task with which the committees are confronted.

Referring again to what I must call, for want of a better name, the charter under which we act, otherwise known as Regulation 2M of the Defence of the Realm Act, we find that (*inter alia*)—

“Where the Board of Agriculture and Fisheries, after such consultation with the Food Controller as may be arranged, are of opinion that, with a view to maintaining the food supply of the country, it is expedient that they should exercise the powers given to them under this regulation, the Board may—

- (a) enter on and take possession of any land which in their opinion is not being so cultivated as to increase, as far as practicable, the food supply of the country, and, after entry thereon, do all things necessary or desirable for the cultivation of the land or for adapting it for cultivation; and for such purposes enter on and take possession of any buildings on the land or convenient for such purposes; and
- (b) take possession of any machinery, implements of husbandry or plant (other than machinery, implements or plant in the possession or under the control of a dealer or manufacturer), or any farm produce, stock, or animals, which, in the opinion of the Board, are required for the cultivation of

land or the increase of the food supply of the country; and

- (c) provide housing accommodation for persons employed for any such purposes by taking possession of any land or unoccupied premises; and
- (d) utilise any water supply or motive power for any such purposes; and
- (e) by notice served on the occupier of any land require him to cultivate the land in accordance with such requirements as the Board may think necessary or desirable for maintaining the food supply of the country and may prescribe in the notice; and
- (f) by notice served on the tenant of any land which or part of which, in the opinion of the Board, is not being so cultivated as to increase as far as practicable the food supply of the country, determine his tenancy of the land on such date as may be specified in the notice, or, on the application of the landlord by order, authorise him in any such case to determine the tenancy in accordance with the terms of the order; and
- (g) after entry on any land arrange for its cultivation by any other person whether by contract of tenancy or otherwise."

Such powers are calculated to make one think seriously. While properly used they are undoubtedly capable of producing excellent results, at the same time they must carry with them great responsibilities for those upon whom they are conferred.

Quite early it became apparent that however energetic a committee might be, it was quite impossible in a county of some 475,000 acres to deal efficiently with the work without the assistance of district committees in the various areas. The existing organisation of these com-

mittees in the rural areas was therefore strengthened and improved. I should like at this point to say that my county has been, and is being, most efficiently served by, and is receiving invaluable assistance from, the district committees. In nearly all cases these committees are meeting regularly, advising and assisting the main committee to the full extent of their powers. Experience shows that a well-organised and able district committee is not only ready but extremely anxious to undertake a large amount of the work in its area. In my opinion it is only by devolving as much work as possible upon those district committees who have shown themselves able to carry it out, that the immense amount of work falling upon the main committee can be satisfactorily accomplished. The closest co-operation with the committees is maintained by a system of weekly circular-letters from the main committee on all important subjects, and by weekly reports of their proceedings and meetings, which many, if not all, send regularly to the executive.

Obviously the first important duty cast upon an executive committee was that of arranging for a preliminary survey of its area, for the purpose of ascertaining the derelict and under-cultivated land which required immediate attention. Bearing in mind the fact that practically no material whatever was available to work upon, this was an imposing task. Speaking of my county, the means to be employed were the subject of careful consideration. It was, however, quickly decided that the most ready method was to base this survey upon some of the existing information in possession of the Valuation Department. The Board of Inland Revenue had already issued instructions which enabled such of the information as was then pressingly

and urgently needed by these committees, and which was not of a private or confidential nature, to be placed at their disposal. I should like to express my thanks for the opportunity which was thus afforded to me and others to take our part in this great work.

Acting on this information, schedules were at once prepared, showing on a form (copy of which is attached to this Paper) the original valuation number, the parish, the name of the farm, the total area, and the name of the tenant. Separate schedules were prepared for each parish, and the 6-inch Ordnance maps were coloured, holding by holding, and numbered to correspond with the schedules. It was necessary to eliminate small areas as the reports were required at the earliest possible moment, and it was deemed desirable to concentrate on the larger farms.

In addition to the five columns of the schedule already mentioned, there were other columns showing—

- (1) Area of grass and of arable;
- (2) Area already satisfactorily cultivated;
- (3) Land not producing up to full capacity, viz.,
(a) arable, (b) grass that should be brought into arable, and (c) grass that could be improved;
- (4) Vacant land capable of being improved;
- (5) General remarks;

which required to be completed.

In view of the nature of the information which it was desired to obtain, it was decided that members of our own profession, resident and practising in the county, especially those whose work lay among the agriculturists, should be approached with a view to their undertaking the work of completing these

schedules. To me it is a matter of great pride in our profession that those who were approached placed their services at the disposal of the committee. Some seventeen of the leading surveyors (the majority of whom are Members of this Institution) carried out this original survey without fee or reward.

With this information at their disposal, the committee were able at once to direct their energies to the more pressing cases of indifferent cultivation to which their attention was specially called.

In those cases where an adverse report was given by the surveyor upon a farm, the particulars were extracted from the survey and put on a card with any other necessary information. These cards were then distributed to the district committees with a request that they would consider the report, and add, from their local knowledge, any comments or recommendations that they might deem desirable. In the majority of cases the district committees dealt thoroughly with these special cases. The comments and recommendations made by them formed most valuable data upon which the executive committee could base their action. This committee at once commenced to deal with these cases. Where it was considered that the matter was one of mere neglect through failure to appreciate the importance of full cultivation at the present time, a letter was addressed to the occupier calling his attention to the matter, and asking him to advise the committee that he was taking steps to amend his ways. In a great many cases this letter produced the desired result. In cases where it was felt that the neglect was due to more serious causes, a letter of a much more stringent nature, advising the occupier that the committee would proceed to take steps under the

regulation referred to if an improvement did not take place, was found, in many cases, to have beneficial results. In other instances, more serious still, the executive officer was instructed to visit the farm, interview the tenant, and report to the committee.

A series of inspections at monthly or other intervals followed, and these have been found, even in very bad cases, to produce most excellent results. These monthly or other inspections have been carried out as far as possible by the executive officer, but where pressure of other work has prevented his going, it has been found that an active district committee will often carry out these inspections perfectly satisfactorily and report the progress month by month to the main committee. The results of these periodical inspections are carefully noted on what is called a "record card" (copy attached), so that the history of the case is apparent immediately the docket is referred to.

May I quote from an article in the *Estates Gazette* of November 3rd:—

"A significant illustration of the necessity which undoubtedly exists for closer and more business-like cultivation of the soil comes from the Food Production Department. It has been reported to the department that a farmer had not only not cut his corn last week, but that he was still making hay, although labour has not been particularly scarce in his district. It appears also that part of the hay crop was still uncut last week. We cannot therefore be surprised that it should be suggested that local black lists of farmers who cultivate badly should be drawn up. The time has come to make it clearly understood that the man who farms his land badly is an enemy to the State. Happily, something is already being done in this direction by the county agricultural committees, but there is plenty of room for tightening up."

The committee on several occasions have interviewed farmers about whose cultivations complaints have been lodged, and the position has been frankly and definitely explained to them with satisfactory results, while the fact that a man has been exempted from military service for the purpose of food production is regarded as a special reason why he should be called upon to make, if anything, a more than ordinary effort to produce the utmost from his land.

There remain those cases where neither letter nor inspection is likely to produce the desired effect, and it has been found necessary to take action under Regulation 2M (1) and remove the tenant entirely. In these cases the committee either farm the land themselves, arrange for the letting to other tenants, or, as they have done in some cases, secure the services of able and willing farmers associated with the district committee to farm on their behalf.

There is another alternative, of which my committee has not had actual practical experience, although they were on the point of carrying out arrangements when the district committee concerned volunteered to supervise the farm in such a way as to relieve the executive committee of future anxiety. This method is by obtaining the assistance, either voluntary or otherwise, of a farmer of repute in the neighbourhood to overlook the management and advise the existing tenant in the cultivation of his land. I should personally be very pleased indeed if any member of a committee here, who has seen the working of this method of dealing with a badly cultivated farm, would give his experience as to the desirability of such an arrangement, and the practical results obtained therefrom.

Speaking generally, I am sure that the moral effect

of the work is much greater than any tabulated returns under various sections would show; the fact that the powers are possessed by a committee in numerous cases enables them to put pressure on landlords, tenants, and even, if I may be allowed to say so in such company, agents, to arrange voluntarily the replacement of indifferent farmers by those of better calibre. So far as my own district is concerned, I should say without hesitation that what has been done in this way would far exceed anything that has been carried out directly under particular instructions or sections.

My own personal opinion is that it is undesirable for a committee actually to farm land for any length of time if this can be avoided. It is much better to get a new tenant in occupation as soon as possible. The committees have the oversight of very large areas. Actual farming of particular land is, in my opinion, calculated to absorb an undue proportion of their time and attention, which could be better occupied by the oversight of larger areas.

It is quite unnecessary, perhaps, to add that all classes of occupiers have been dealt with. In fact, I feel that it is not the occupier, nor the owner, nor anyone legally connected with land, with whom we are really dealing, but with the land itself, and the necessity of making land which is capable of producing food wherever and whenever found bear its share in this most urgent and pressing duty. In short, the principle which must guide our efforts is that whatever the position may have been in the past, at the present time the occupation of land carries with it a definite responsibility to the country. No excuse must be allowed to stand in the way of the discharge of this responsibility to the full.

It is right to acknowledge the assistance that has been rendered by many owners and their agents in carrying out this difficult work. The special knowledge that they have of the circumstances and peculiarities of various tenants and the capability of the land has often guided the committee in the action that they have taken.

Soon after the returns of the early survey were received a first batch of tractors were delivered in the county, and the question of the use, capabilities, and, if I may say so, drawbacks, attached to the use of the tractor has ever since been a pressing and urgent question with which the committees have had to deal.

Arguments for and against the tractor have been put forward in all quarters, but I am one of those who believe that the tractor has definitely come to stay, and that in the future it will play an ever-increasing part in agricultural operations.

I think it would be out of place for me to enter into any lengthy argument as to the use and value of the tractor, but I believe that many who regarded it at first with doubt are now most anxious to welcome its assistance.

In common with others we have suffered from breakdowns and failures under certain conditions, but these are surely unavoidable in an experimental state, and we can remember, for example, that the motor-car of years ago was a very different mechanical proposition from the almost perfect product of the present day. In addition the tractor had the very great misfortune of coming seriously into play just at the time when the supply of suitable labour was almost at its lowest ebb. It was necessary to commence not only with an almost untried implement but with inexperienced men to work it, and

it is little to be wondered at that in the early stages delays and breakdowns occurred. The efforts which the Board have been able to make to train drivers for these tractors are now producing the best results, and both the quality and quantity of the work turned out week by week is increasing proportionally. In the arrangement and management of these tractors we have found that the services of the district committees have been invaluable. Many months ago we not only formed our own machinery sub-committee to deal with this and similar matters, but we asked each district committee to form their own machinery sub-committee, the members of which would undertake the oversight and management of tractors working in their area. The present scheme of tractor organisation in my county took some little time and experience to evolve, but I think I may claim that the arrangement now in force is giving improved results week by week. Briefly, apart from the scheme of the Board, which is familiar, no doubt, to you all, we work on the principle of asking all farmers to forward their requirements for tractor working to the secretary of the district machinery sub-committee. This committee then decide, from their local knowledge, whether the land the tractor is applied for is suitable for the purpose, and approximately the time at which it should be ploughed. At the offices of the executive committee is a schedule for each tractor, and on receipt of the information referred to from the secretary of the district tractor committee the machinery officer enters on this schedule the forward work of the tractor. In addition to this he plots out the nearest and most convenient route by which the tractor can travel, and furnishes the engineer with a copy of the schedule and route card, so that there is no possibility of delay.

Special post-cards are supplied to the engineer and driver of the tractor, on which they notify any movement to the machinery officer. A 1-inch map of the area is also kept in the offices, having pinned flags with the number of the tractors, the flags being moved from place to place and in this way showing at any time the exact position of each tractor.

I now turn to the scheme for bringing a large area of existing grass land into arable cultivation, and certainly no question at the present time can be regarded as a more important part of a committee's work.

Here, again, I must quote some paragraphs from the letter of the President and Director-General before referred to :—

“The danger of shortage extends beyond the period of war. In some respects it may be greatest after peace is proclaimed. This grave situation, therefore, insists that we should recast the rules of good husbandry as understood by ourselves and practised by our forefathers during the nineteenth century. In that period the farmer learned that what was required of him was quality. Now, however, we are forced to consider quantity. Regarded from this standpoint and from the national point of view, grass land, even good grass land, is relatively of much less value than tillage land. An acre under wheat may yield ten times as much human food as an acre of good fattening pasture, and on the average of the whole country, it is estimated that tillage land is producing at least four times as much human food per acre as the land under grass.

“It is essential, therefore, that the policy of breaking up grass land should be pressed and extended.

“Some committees have contended that it would be sounder policy to concentrate all the available supply of labour and machinery on the existing arable land because of its foul condition. But it must be borne in

mind that the object is to increase to the maximum the production of food at the harvests of 1918, 1919, and 1920. Even if all possible efforts were made, as we hope they will be made, to clean the arable land, the maximum production of food would not be obtained. The acreage now under the plough is in many cases exhausted. On the other hand, newly ploughed grass land is cleaner than most of the existing arable land; it is in much higher manurial condition; it is therefore capable of producing more corn within the next few years. Thus the admitted fact that the arable land is foul and exhausted only confirms the policy of ploughing up grass, and it must be remembered that much of that work can be done during the months of December, January, and February, when operations on the arable land are largely suspended. Though this land may not yield much in 1918, it will be ready for proper cropping in 1919 and 1920, when the need will be equally great."

When the original instruction for conversion of grass land was received by my committee, the method by which the work should be carried out was most carefully considered. It was decided that the lines upon which the original survey had been made should again form the basis of procedure in this case. It was felt, however, to be unreasonable to ask the surveyors, who had already voluntarily given a large amount of their time to the first survey, to offer their services again for this much more onerous and responsible undertaking. The committee felt, however, that the surveyors would recognise the national importance of the work, and that they might be prepared to undertake it for a moderate remuneration. Accordingly a meeting of the surveyors was held, and the whole matter discussed frankly with them, and subsequently, by arrangement with the Board, some twelve districts were mapped out and allotted to

surveyors, all of whom had taken their part in the original survey. A new form of schedule was then prepared (copy of which is attached), and these schedules, together with copies of those of the old survey and plans, were forwarded to the surveyors for their returns. As it was necessary that the various fields should be identified and their acreage shown, and with a view to saving time, additions were made to the original 6-inch maps before they were sent out again, showing the Ordnance number of each field and the area.

The form of schedule for this survey gives the parish, district, surveyor, and two district committee representatives, and the following columns:—

- (1) Number.
- (2) Name of farm.
- (3) Tenant.
- (4) Grass fields to be ploughed, and when, showing Ordnance No., area, approximate time of year, and description.
- (5) If agreed with (a) district committee, (b) landlord, (c) tenant.
- (6) Will assistance be required? if so, what kind?
- (7) Remarks.

Before the survey was commenced, a letter was sent from the chairman of the committee to all the landlords in the county, requesting them to ask their agents or representatives to give all necessary instructions to facilitate an inspection of the land, and appealing to them, with full confidence, to help the committee. They were also notified that the committee would be pleased

to give the name of the surveyor in any district in which the particular landlord was the owner of land, and any further information that might be of interest. Another letter was also sent to each of the farmers in the county, appealing earnestly and personally to them to give the whole matter their serious consideration, with a view to making suggestions from their knowledge of the land on their farms as to which portions could be best converted from pasture to arable.

It will be noticed that in each parish it is suggested that two representatives of the district committee should act with the surveyor in selecting the fields. In the majority of cases the surveyors have worked in close co-operation with the district committees and their representatives, even attending their meetings and consulting with them when arriving at their decisions. During their inspections the surveyors, in most cases, have had the opportunity of interviewing the farmers and discussing the whole question with them, while similar opportunities have also arisen for discussion with the landlord or his agent. The result of all this has been that in many instances the schedules have been returned, setting out the definite fields decided upon, and showing that the landlord, the tenant, the district committee, and the surveyor were all in agreement as to the desirability of the grass being converted. It is obvious that in such cases the work of the executive committee has been very materially assisted, and they have been able, in such instances, to make rapid decisions to the benefit of all concerned. Early in the scheme the question was raised as to possible compensation that might be claimed by interested parties in connection with this work, and it will be recalled that it was decided that in all cases, whether voluntary or otherwise, it was desirable that

an order should be issued under Section (1) (e) of Regulation 2M so that those interests might be protected. The practice of my committee, therefore, has been that in all cases arising under the survey an order is issued on the occupier under this section. In many instances, notably those which have already been referred to, no question has arisen, and the work of conversion has been and is being rapidly pushed forward, but of course there are many cases where objection has been lodged. In precisely the same manner as the work in connection with machinery rendered it necessary to appoint a sub-committee to deal specially with those subjects, so in the case of these surveys it became necessary to appoint a lands and survey sub-committee. Their special duty has been to deal with this whole question of cultivation and grass breaking, and it is by them that the various objections to conversion have been and are being dealt with.

At this point I may perhaps explain that this sub-committee comprises not only members of the executive committee, but also chairmen of several district committees, and it is seldom, therefore, that a matter comes before them without the benefit of the advice and assistance of at least one member who is intimately acquainted with the land under discussion.

The practice of this committee is, first of all, to consider carefully the returns above referred to, and having decided with the information before them that the land is such that should be converted, the order above referred to is issued by the executive committee.

On the receipt of an objection to plough, the committee take the earliest opportunity of again consulting both the district committee concerned and the surveyor who made the return, and they frequently interview the

occupier and also the owner, or his agent, on the matter under discussion. Every effort, of course, is made to get the true facts of the case, and, after careful consideration, the parties concerned are advised by letter either that the order to plough the whole or some part of the land will be suspended, or that the original order of the committee is confirmed and must definitely be complied with.

It is impossible to avoid some mention of drainage. In many districts this is a matter of the utmost importance, and it has received careful consideration from my committee. The subject seems naturally to divide itself into two parts :—

- (a) The provision of new drainage for arable cultivation;
- (b) The improvement of existing systems.

With regard to (a) the difficulties of material and labour are very great, but whatever possible is being done. Mole-draining, which naturally suggests itself, can be employed only in limited areas, as steam tackle is already overloaded with other work. It seems more than ever important, therefore, to give all attention possible to (b). There is no doubt that, owing largely to the lack of labour, ditches and waterways generally have been sadly neglected. For a short time this might not have been of much consequence, but continued for several years it has resulted in a serious condition.

The Drainage of Lands Order, 1917, made by the Board under Regulation 2M of the Defence of the Realm Regulations, gives committees considerable powers to deal with this matter. It is felt, however, that, except in isolated cases which present no difficulty, it is no use dealing with this question in a piecemeal fashion.



To be effective the work must be done throughout the whole course, and, unfortunately, as far as I can trace, there is no drainage board or similar body in our county with whom the committee can deal. While the committee at the present time are seriously engaged with this problem and are receiving the advantage of the advice of the Board's chief drainage inspector, who has recently visited the county, I admit that I mention the question more in the hope of eliciting suggestions from those who have been able to effect improvement than of giving any results from our experience.

The question of additional assistance of all kinds required by farmers called upon to convert land immediately arose, and this is a most important one. The method by which it is dealt with is as follows: Where assistance by tractor is required the matter is referred to the machinery sub-committee, who supply the necessary assistance as soon as possible, preference in all cases being given in arrangement of route and work of tractors to demands made for the specific purpose of the conversion of grass land. There are, however, a large number of cases where tractor assistance is not suitable, and for these the scheme arranged by the board, under their circular F.P. 92, is brought into operation. Under this system teams of horses with ploughmen are available, and the labour sub-committee make the necessary arrangements for their provision at the earliest moment. This latter scheme is, at the present time, somewhat in its infancy, but the operations under it have commenced in a most satisfactory way, and it shows every sign of developing into a most useful adjunct to the machinery ploughing, and will undoubtedly largely increase the facilities for the conversion and cultivation of this new area of land.

I suppose there is no question which has caused more anxiety to the agricultural community, and has needed greater efforts on the part of these committees, than labour. In the early stages the interests of the agricultural community were protected by the presence of the agricultural representatives at the various tribunals, but they had no definite power, nor had the committee, to retain the essential men upon the land, the final decision remaining in the hands of the tribunal. On the 15th June the Board issued an Order that as from the 14th June no man certified by the agricultural executive committees to be whole time engaged on a farm on farm work of national importance could be posted to the Colours. This Order had great and far-reaching results, and of course, at the same time, carried with it considerable responsibilities. The passing of the Military Service (Review of Exceptions) Act, 1917, also placed upon the committee the responsibility of certifying men who, upon receipt of the calling-up notice for medical examination or re-examination entered a claim that they were whole time engaged in agriculture, and the committees were authorised to certify those cases which in their opinion, after due inquiry, fulfilled this requirement, so that the services of the men so certified were retained upon the land.

It was some time earlier than this that my committee had decided that the labour question was so important that it should be dealt with by a special labour sub-committee, and this was formed from members of the executive committee, with the addition of a few others who had shown a special interest in this matter. The work of this sub-committee has increased enormously, and it has been found that this work has required constant and unceasing attention.

In those cases where it has been found impossible to retain men, or where men had left before the present system came into operation, or where additional labour of any kind has been required, practically the only means of supplying the want has been from the Army and, later, by women from the Women's Agricultural Committee. With the latter I do not propose to deal, except to say that most valuable work has been and is being done in this direction by the committee referred to.

On the question of soldier labour it is impossible to deny that in some cases there has been unavoidable disappointment, but I do suggest that in some cases, at all events, this may have been due to an over-exacting standard set up by the farmer as well as to the unsuitability of particular men. In the spring it will be recalled that the Army definitely released for the purpose of the spring ploughing a considerable number of skilled ploughmen, and the experience in my county was that the services rendered by these men were of incalculable benefit at a time when they were most urgently needed. The whole tendency of this Army labour has been in our experience towards constant and increasing improvement, and, owing to the amended arrangements, the class of man now available for agricultural service is becoming more and more satisfactory as time goes on.

I must now pass to some of the less important items that demand a committee's attention, and perhaps first I may take

Horticulture.—A valuable addition to the food supply of the country has been secured by increased cultivation of allotments and cottage gardens, under the direction of a special horticultural section of the Food Production Department of the Board. In Bucks

the county horticultural instructor was allowed by the Agricultural Instruction Committee to devote his time as his chief work to stimulating allotment-holders in the county to secure full production from their land. Regulation 2L under the Defence of the Realm Regulations delegated to allotment authorities in borough and urban areas the powers conferred by the Board by the regulation, subject to the restriction that allotment authorities might not enter upon occupied land without the written consent of the occupier unless they obtained the sanction of the Agricultural Executive Committee of the county. In several cases my committee were approached by borough and urban authorities to give the necessary sanction, and after the owners and occupiers had been requested to state the objections to the proposed course, in suitable cases the committee gave the necessary sanction. The horticultural instructor has inspected gardens and allotments throughout the county and reported upon indifferently cultivated land, when the committee have taken steps to bring about improvement. The work of the horticultural section has included demonstrations and advice upon potato spraying, the preservation of fruit and vegetables, demonstrations in bottling and preserving, and the distribution of sugar for preserving fruit grown by the applicants. There is no doubt that a considerable addition to food supply has resulted from the action taken in this direction.

The Sale of Horses Order, 1917, has thrown considerable work on committees. With a view to retaining an adequate supply of horses on the land, and to prevent their being taken for less important uses, in June Regulation 2T was made under the Defence of the Realm Act prohibiting the sale by the occupier of an agricul-

tural holding of any horse used or capable of being used for the cultivation of land except under licence. The operations of this Order have had an important effect upon agriculture, and have tended to protect the farmer from himself. The Order made it necessary for a licence to be obtained from the executive committees, who had to be satisfied that the horse which the farmer wished to dispose of was surplus to his requirements. This enabled the committee to see that a farm was not depleted of necessary horses, and this was specially important where an Order to convert grass land had been issued. Naturally a committee endeavours to avoid hardship wherever possible, and every effort is made to secure that licences may be granted without any delay, but there is considerable work entailed in discharging the duties under this Order.

Credit for Farmers.—In the spring of the year the Board, desirous of assisting those farmers who were anxious to increase food production, but whose efforts might be limited through lack of the necessary capital for purchasing additional fertilizers, seeds, &c., inaugurated a system of short-term credit. This enabled credit to be given at the discretion of agricultural executive committees for the purchase of certain necessary items, but not for the payment of wages, while for the work in connection with grass breaking the Board extended this system of credit to include payments for working horses, machinery and implements. It will be obvious that committees to whom these applications are made have to be very careful in their recommendations. My experience is that up to the present this assistance has not been applied for to a great extent, though the few cases dealt with have had beneficial results.

Damage by game is a question that has required considerable attention from committees. Pheasants and rabbits seriously affect the amount of food produced from certain lands. Committees have therefore been empowered by the Pheasants Order and the Rabbits Order to authorise persons to enter upon land and kill or take the pheasants or rabbits which are causing this damage. Similarly, damage by rooks is met by the Rooks Order, which gives similar authority.

The question of game has always been a difficult one, and easily gives rise to disputes. The suggestion has been made that certain landlords may take action against a tenant who exercises his own rights or complains to a committee of loss under this heading by giving him notice to leave his farm. Unfortunately at present there seems nothing to prevent a landlord taking such action against a tenant who complains to a committee on this or any similar matter. I cannot help feeling that the fact that these committees have the powers, and will exercise them whether the tenant goes or stays, particularly if they make a point of doing so in those cases where there is good ground for believing that the landlord is acting in the manner referred to, must be some check on such action taking place.

The whole game question is undoubtedly a most serious one just now, and here again I cannot do better than quote the paper I previously referred to:—

“What is to be the future of the pheasant? It is notorious that wherever they exist in considerable numbers pheasants are a danger to crops. In one neighbourhood in Suffolk there has been in one case so much damage that the district executive has ordered them to be shot without delay before corn sowing becomes general. Any serious reduction in the amount of game would be a loss to the food supply,

especially as regards variety; but if we have to choose between pheasants and wheat it is clear that the wheat must come first. Before the war the maintenance of a large head of game could often be defended on the ground that the soil was of little use for agriculture, and that birds produced a larger revenue than crops. Henceforth the crops must receive the first consideration. This by no means implies the extinction of sport—there is likely always to be a sufficiency of winged and ground game to satisfy reasonable sportsmen and keep the market fairly supplied.”

Fertilisers, Seeds, &c.—In order to assist farmers in procuring supplies, executive committees were asked to form supplies sub-committees to deal specially with this matter. These sub-committees, working through a system of approved agents in their areas, are arranging to keep certain stocks, and there is little doubt that with their fingers on the pulse of both supply and demand they are rendering valuable assistance in a much needed direction.

Next there is *Petrol*. The increasing use of machinery for so many purposes of agriculture has resulted in a much larger demand for petrol, and the need of securing an adequate supply for the farmers' requirements was early recognised by the Food Production Department. The work of dealing with these applications from agriculturists and others engaged in the essential work of producing food was devolved upon the executive committees, as the only competent authorities possessing the necessary local knowledge to make the recommendations.

There are many other subjects which fall to be dealt with by these committees, but I think I have said enough

to justify the view I expressed that they are of vital importance to agriculture.

It will be apparent that work of this kind demands not only the attention of the members of the committee but the whole-time work of qualified officers. My committee, I think, has been singularly fortunate in this matter, and those who are engaged upon the work know how much that means. The necessary staff includes the executive officer, the principal technical adviser (whose duties are of the greatest interest to this profession), the machinery officer in charge of the work of the tractors, &c., the labour officer, the supplies clerk, and the secretary, on whom so much depends.

I am writing just after listening to the most able address delivered by the President on November 12th, and I need scarcely say that I followed his remarks on the Corn Production Act with the greatest interest. At the moment the provisions of this Act can hardly be said to affect acutely these committees, but in the future they will be of vital importance to them. By Section 11, Subsection (3), of that Act it is provided that "The powers under the Defence of the Realm Regulations exercisable by the Board of Agriculture and Fisheries with a view to maintaining the food supply of the country with respect to the matters dealt with in this part of this Act shall cease to operate at the expiration of one year from the passing of this Act (21 August, 1917), or at the termination of the present war, whichever is the earlier, and thereupon this part of this Act shall come into operation."

Under Regulation 2M the committee, under the powers delegated by the Board, are authorised to enter on land which, in their opinion, is not being so cultivated as to increase as far as practicable the food supply

of the country, and then to farm it, or let it, or to serve notice on the occupier of any land to farm in accordance with their directions. Under the powers of the Corn Production Act the Board is empowered in any case where they are of opinion—

- (a) that any land is not being cultivated according to the rules of good husbandry, or
- (b) that for the purpose of increasing in the national interest the production of food, the mode of cultivating any land or the use to which any land is being put should be changed,

to serve notice giving directions for cultivation, and if the occupier fails to cultivate in accordance with these directions to determine the tenancy, or, if the occupier is not a tenant, then to enter on the land. The question, however, as to whether the land has been cultivated according to the rules of good husbandry, or whether it is undesirable in the interests of food production that the change should apply to any portion of the land included in the notice, is subject to appeal to arbitration by the person on whom the notice is served, while copies of notices served on a tenant are required to be served upon a landlord at the same time, and previous notice must be given of inspections.

It remains to be seen whether the limitation of the present powers of the executive committee will detrimentally affect their work—that it will make it more difficult or cause some delay it is, I think, impossible to deny—while the question whether the best agriculturists will be willing to serve on these committees when they know that their decisions are to be the subject of appeal by any person who feels himself

aggrieved by their action is one that can well be left to the future to decide. Personally I sincerely hope that by August, 1918, the submarine menace may not threaten us so vitally, and that the national danger attaching to neglect of cultivation may, by a change of circumstances, be less acute, but if, unfortunately, such should not be the case, I for one shall much regret that the powers of these committees have been reduced by the smallest fraction.

Looking backward, I feel how much our committee is indebted to the fact that it practically commenced its work under the chairmanship of Sir Arthur Lee, the present Director-General of Food Production, to whose untiring energy the nation owes so much at the present time.

The work has been of an exacting character, the meetings being frequent and prolonged, but I feel sure that others will confirm my experience that the importance of the task has been the surest guarantee that every effort is being made to accomplish it. May I be allowed at this point to express my thanks to the present Chairman and the other members of the Bucks Committee, who, in addition to many other kindnesses, have allowed me to use much of the material for this Paper?

Looking forward, I feel that with the valuable experience gained in the past, with the promise of greater mechanical and other assistance in the future, and with the loyal co-operation and help of the district committees with their most valuable detailed knowledge, far better results in every way will be obtained from the work in the future.

In conclusion, may I ask, Is it possible for anyone even remotely connected with agriculture to refrain

from a deep and increasing interest in all that is being done? I appeal with great confidence to my profession to use the influence and power they possess to bring to the notice of the agricultural community on all possible occasions the advantages to be derived from a close and intimate association with their district and executive committees and, through them, with the Board of Agriculture.

No one will claim to have done all that was desired. All will admit, I think, that mistakes have been made, and I venture to suggest that the more closely one has been identified with the work the more ready he would be to recognise shortcomings; but at least I claim that, summoned unexpectedly in a great crisis to do their best with a gigantic problem, those concerned have tried their utmost to serve their country.

First Survey.

COUNTY WAR AGRICULTURAL COMMITTEE.

Parish of

Rural District of

No.	Parish.	Identification.	Total Area.	Tenant.	Area. Grass. Arable.	Area already satisfac- torily Culti- vated.	Land not producing up to full capacity. Grass that Arable, should be brought into improved, a- rable.	Vacant Land capable of being improved— As Arable. Pasture.	Remarks.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
			a. r. p.		a. r. p.	a. r. p.	a. r. p.	a. r. p.	a. r. p.	a. r. p.	a. r. p.	a. r. p.	

Docket No.

AGRICULTURAL EXECUTIVE COMMITTEE.

FARM INSPECTION, & CO., RECORD.

Farm

Parish

District

Landlord

Tenant

Total Acreage

Grass

Arable

Date of Inspection, and by whom.

Cause of Action.

Committee's Decision.

Result.

Date.

Progress Statement.

AGRICULTURAL EXECUTIVE COMMITTEE.

Second Survey.

Parish

District

District Committee Representatives

Surveyor

Name of Farm.

Tenant.

Grass Fields to be Ploughed and when.

Approximate
time
of Year.

Description.

If agreed with
District
Committee.
Please write
"Yes."Will assistance
be required?
If so, what
kind?

Remarks.

The PRESIDENT, previous to calling on Mr. Raffety to read his Paper, had said it gave him much pleasure to mention that the author's work had already been recognised by His Majesty. They must congratulate him on the fact that he had been created an Officer of the Order of the British Empire.

Mr. RAFFETY, O.B.E., before reading his Paper, thanked the President for the kind reference to the honour conferred upon him, and for the kind manner in which the Members of The Institution had received those remarks.

DISCUSSION.

Mr. C. B. FISHER (Fellow), in proposing the vote of thanks to Mr. Raffety, joined in congratulating the author on the Order he had received, and the fact that owing to the war Mr. Raffety's services had been transferred from the Valuation Department, which represented a policy of which they might not all be enamoured, to an important national work. This had enabled him to read a Paper which would form a record in the history of this great war of the efforts that they had made to increase the food supply. It enabled not only those present but all the Members of The Institution to have before them a Paper which focussed their endeavours, and one which would be handed down to future generations.

He would like to go a little further back into the history of the attempts to improve food production than Mr. Raffety had done. As a member of the first Consultative Committee of the Board of Agriculture, he

referred to a time nearer the commencement of the war, when some of them, including Members of The Institution, attended almost daily at The Institution to confer with representatives of the Board of Agriculture as to what steps could best be taken. To their credit it should be said—and Mr. Goddard, who was Secretary to that Consultative Committee, would bear him out—one of the first things they considered to be essential was the setting up of an organisation to take control and, if necessary, provide for an increased production of food. From the first they saw the necessity for organisation, and on the 15th August, 1914, eleven days after the declaration of war, a scheme for complete organisation was in print which included the formation of committees which they christened the "County War Agricultural Committees." That committee therefore was christened a year before it was born! It was not until the following year, when Lord Selborne was President of the Board of Agriculture, that the first County War Agricultural Committee was formed and the present movement was begun, after Lord Milner's Committee had reported. At that time there was much disappointment because, although, as stated in the Interim Report, they considered it to be essential for the encouragement of a larger production of food that a guaranteed price should be given for corn, when that matter was further considered, they were faced with Sir Harry Verney's statement in a Minority Report that since they had made their report the Government considered the submarine menace was apparently well in hand. In consequence it was not until January, 1917, when Mr. Prothero became President of the Board of Agriculture, that any inducement to grow more corn was held out.

In December, 1916, there was a committee which also met in that building, and of which four, out of its six members, were Members of The Institution. This committee had considered agricultural reconstruction with a view to insuring an immediate increase of the food supplies.

Almost immediately after Mr. Prothero's appointment as President of the Board of Agriculture, a great part of their suggestions were adopted, including the formation of a Central Executive Committee, and from that emanated the County War Agricultural Executive Committees.

Those who have served on the County War Agricultural Committees know that it was then the work began.

The scheme of organisation had to be arranged, staffs appointed, and sub-committees formed, the sub-committees dealing with such matters as tractors, horses, labour, and cultivation, and in consequence the work of organisation increased enormously. So much so that in Northamptonshire, where he was on the committee, from 100 to 150 letters were now being received daily, and in October, besides circulars, 4,464 letters were sent out. They had from 90 to 100 callers every Saturday, and they were dealing at the present time with 171 German prisoners, 840 soldiers, 81 horses, and 34 tractors. In addition to that, through the energy of the Women's Committee, there were some 2,549 women who were employed on the land during the same month.

Mr. Raffety had mentioned the question of tractors. Personally he believed that the internal combustion engine would in the future revolutionize methods of husbandry, as it had done with road traffic, with flying,

and with submarines. They were by no means perfect at the present time, but, as one who had now used a tractor for some three years, he thought it was most advisable that on large farms, at any rate, they should be used not only for ploughing and thrashing, scuffling and harrowing, but for many other purposes; and the reason the motor tractor had come to stay was that, being an internal combustion engine, it could be applied to many different purposes, whereas the steam engine had, as a rule, hitherto to be utilised for one purpose alone. Many people had found fault with the tractor—two members of his own committee had been very much against them—but one of those objectors was now, he believed, a convert, and the other, he thought, would be so very soon.

Many instances of the breakdown of tractors could be given, but he would like better to give an account of the work done by one in Northamptonshire during the week ending November 30th. It was a Titan, 20 h.p.; it consumed $1\frac{1}{2}$ gallons of petrol, 152 gallons of paraffin, and 9 gallons of oil, and it ploughed 38 acres in $65\frac{1}{2}$ working hours, working over three fields, and not, therefore, having the advantage of one large clear area to work in. The drawback to motor tractors had been that the organisation through the Foods Production Committees was on the mechanical side, and not on the agricultural side. Several tractors had been run in Northamptonshire independently of the central authorities. Care had been taken in selecting the men who were trained for a short time in ploughing, and as they were not sent out until it was proved that they were capable of ploughing the land, no difficulties had arisen. In his experience the faults that gave rise to the complaints were due to the fact that the mechanics

had not realised the necessity for a thorough understanding of ploughing methods. In districts where they had been trained they would find the people were enthusiastic over the tractor. They had placed three tractors under the supervision of three enthusiastic young agriculturists, and having the advantage of these trained ploughmen, they had converted many farmers in the district.

What were agriculturists asked to do to-day? They were asked to plough 2,400,000 acres of turf or grass seeds before the end of April. In Northamptonshire their share was about 55,000 acres. Ought that to be an impossibility? Forty years ago they had 92,632 acres more arable than they had at the commencement of the war, and consequently he did not consider that it was by any means impossible to convert 55,000 acres out of those 92,000 acres to arable again. There were people who said that their land was too heavy or too light and unsuitable, or they made some other excuse for not doing so, but surely was not the land that used to grow wheat in the olden days the land that should be ploughed up, and grow wheat again now?

He had valued in 1911 and 1912 about 12,000 acres under grass in Northants and Bedfordshire, of which the average rent was only 13s. an acre, that being in a wheat-growing district. At times he had been dismayed that land in England should not be put to better purposes, and he had had the opportunity of taking one of the principal Danish agriculturists to see some of this land in Northants and ascertaining his opinion. One parish which they visited had a population of 400 some thirty or forty years ago, but at the time of their visit it had decreased to 170. One farm was about 300 acres, on which from ten to twelve men used to be employed, but

was now all under grass, and only one man was employed. Some 60 fields of 10 to 30 acres each had been laid down or tumbled down to grass in the immediate locality. According to the rent and basis of prices at the time, the value of the land could not have been worth more than £15 per acre. He asked his visitor what the land would have been worth in Denmark. The Dane said candidly that he could not understand Englishmen, and he thought, even with the buildings such as they were, the land in Denmark would have been worth £30 per acre at least. Consequently, in his visitor's opinion, and certainly in his own, that land was not then being put to its best use. That this should have been brought about by our policy in the past was to his mind an absolute sin, and if politicians in the future should allow the country to go back again to a state of things that would distract the people from country districts and so reduce the production of what was good wheat-growing land, it would be worse than a crime.

Another reason why they should plough more land was because as arable it could be made to produce more sustenance for a human being per acre than as pasture. At the Farmers' Club a short time ago Dr. Russell read a Paper in connection with this, and according to his figures every acre under potatoes, even though it grew only 5 tons per acre, was capable of supplying food for one man for 1,500 days, and with wheat an acre would supply food for one man for 700 days; but medium pasture would supply a man with food for only 140 days, and poor pasture, such as he had described, would supply him with food for only six days.

On October 9th last the Prime Minister said: "This
" is a great chance for the farmers to strike a blow for
" British agriculture; I am one of hundreds of thousands,

“ perhaps of millions, who have realised fully the force
“ and importance of making British agriculture self-
“ sustaining, and it is the war that has brought it home
“ to me.” He (the speaker) hoped that they were determined to expiate the sins of politicians in the past by showing what the land of Great Britain could do in the future. What were the difficulties which confronted them? Want of organisation was being overcome, but another great difficulty still remained, and that was the want of proper co-ordination between Government departments. They had seen one of the difficulties that arose from this in the past, that of taking skilled men from the land, and the consequent difficulty of replacing them. He was glad to testify to the way in which the Adjutant of the Home Forces had always met them in connection with the question of soldier labour. He went to him a year before the labour battalions were formed, and the adjutant most kindly sent them one hundred men to Northampton Barracks to draw upon, and he ventured to think that if there had been greater co-ordination between the two Government departments involved there would not have been the least difficulty in treating every county alike.

He considered this same want of co-ordination was a hindrance to food production, because in many cases the maximum prices as fixed by the Food Controller tended to diminish supplies. Sir Mark Collett, he thought, would support him, that in consequence of the price of meat for January being originally fixed at 60s., there was great danger that the supplies during the next few months would be insufficient. It was extremely unfortunate, as the increased production would have been made at little expense on the luxuriant pastures which prevailed during the autumn months.

There was also the question as to how far the maximum prices had affected the production of bacon, milk, and butter. If there was one thing by which they should benefit it was Germany's experience in regard to fats, showing the necessity, both from the economic point of view of the population and from the point of view of the requirements for actual warfare, that it was essential in every way to encourage the production of all kinds of fats.

In conclusion, he had the pleasure of proposing a vote of thanks to Mr. Raffety, who had been doing a national work in educating those counties which were not so advanced as Buckinghamshire, a work which would be of great assistance to them in Northamptonshire and to War Agricultural Executive Committees generally.

MR. G. TURVILLE BROWN (Fellow), in seconding the vote of thanks to Mr. Raffety for his valuable Paper, said nobody in the country was in doubt about the necessity for increased food production, and that to increase production a real organisation was necessary. He believed that the committees which had been formed for that purpose were about as good as could be got. He found in every county into which he had been that there were really practical men on the committees, and that they had done really good work. It was not pleasant work, indeed it was sometimes most distasteful. It was not pleasant to have to criticise one's neighbours, especially when one considered that farmers, for thirty or more years, had been more neglected by the State than any other part of the community. Before the present necessity arose, farmers were left to help themselves, and now, the first thing they knew was that

somebody came to them and said they were not doing what they should. That was not nice for them, nor was it nice for those who had to do it, but it had to be done, and he believed it was being done in the best way possible. It was being done by neighbours and friends who knew their business. This being so, he was sure it was the duty of those present to give, to the best of their ability, assistance to those committees.

He did not propose to say much upon Mr. Raffety's Paper, but there were one or two matters to which he would like to refer. The first was soldier labour, which had been valuable and was going to be more valuable in the future. As more men were weeded out of the Army, or found unsuitable for military service, he thought they would get more of them for the land. One thing he had found which ought certainly to be altered. In more than one instance he had come across North countrymen working on West-country farms, and *vice versa*. That was not right, the men ought to be sent to those parts of the country and to the agriculture to which they were brought up. In regard to other labour, he thought they should have a further comb-out in the towns. There was still labour left in the towns which ought to have been obtained by the National Service Scheme, but was not—labour which should come out and help agriculturists in the country. In places like Southampton, big urban areas, which had been recruited during the last thirty years from the country, there was still, he believed, more labour to be found which could be usefully transferred from town to country. Also, in regard to German labour, there was an immense lot of prisoners available in this country now. He had a gang of them working on a large arterial drain in Lincolnshire this summer; during the first few weeks the work was

poor, but improved rapidly, and the result had been that the work cost only about 5 per cent. more than it would have cost in peace time. The men were paid 3s. a day each, a part of which they had for themselves, and the result was that there was only a slight increase above pre-war cost. He knew the difficulty of getting small units of only two and three men, but there was not the same difficulty in regard to work on which twenty or more men could be usefully employed, and in those cases such labour was valuable. Another thing in which some of them might assist was with regard to unoccupied farmhouses. He had had such a case before him that day. It might be possible to utilise the houses as hostels for soldiers or interned aliens, and so to assist the labour supply in the immediate neighbourhood. Something also could be done to find housing room for teams of horses to assist farmers. He believed there was such a scheme on foot. He did not know the particulars, but thought that in especially remote country districts such a scheme would be of considerable value.

With regard to tractors, Mr. Fisher had discussed them fully, and he entirely agreed with that gentleman in thinking that tractors had come to stay, and also with Mr. Raffety's conclusions on the subject. They must remember it was not a new thing. The "gasoline set," as it was called in the States, had been used for years, and had done very valuable work on prairie land. Tractors were being tried on a considerable scale in the Lindsey division of Lincolnshire, and though out of forty employed ten were broken down in the previous week, and the thirty in work had not done a great deal more than would have been done by the same number of good pairs of horses, which, of course, was not a good result, he believed it was only a matter of getting the men to

understand the work and that they would shortly get far better results from the tractor. He would not take up their time any longer, except to emphasise once more the dominant note in Mr. Raffety's Paper, which was that if we were to be successful the best must be got out of every man and every acre.

The Hon. EDWARD STRUTT (Past-President) remarked that he congratulated Mr. Raffety on the success of the organisation in the county of Bucks. He might mention that other members of the Land Valuation Department had been of great assistance in the work. In Essex they were very much indebted to the department for a survey and for information about grass lands which would have to be broken up.

Mr. Raffety had drawn attention to the question of game. Personally, as chairman of an executive committee, he had not found there had been many complaints of damage by game. He believed there had been only one case this year, though last winter they had heard a little more about it. No doubt it was a fact that damage was done by game, and he hoped that Members of that Institution would impress on their clients the absolute importance of keeping game down to a minimum. It told against production, and what made it more important that it should be stopped was that it created a very bad impression on the public.

He noticed that Mr. Raffety made no mention of the subject of German prisoners. Mr. Turville Brown had, however, pointed out what good work was being done by them. In Essex they had 800 or 900 German prisoners at work, and the farmers were very pleased with what they had done. The military authorities also were making things easier to organise by not insisting

on such large gangs going together. German prisoners' camps were being formed in many places in Essex, and he recommended strongly that these men should be used to make up the labour which they so sadly needed.

One of the difficulties the executive committee had to deal with had been to provide horses for the gang system which had been suggested by the Food Production Department. They had had great difficulty in getting the district committees to realise how valuable it would be if they could hire out horses to the smaller farmers and others who had not enough to carry on with. He hoped that Members of that Institution would do all they could to impress on all concerned the importance of taking advantage of the gang system for providing horse-power. It might be one of the most useful means of getting land ploughed. He would not say anything about tractors. In some counties they were a great success, in others not so much so. They were started under difficulties, but their worst days were over, and presently the country would be thankful to them for what they had done.

As agents the one thing they had got to do was to insist that farmers should cultivate the land better. In the past he feared they had all been too easy, and the importance of good farming had not been brought home to them, unless it was from the point of view of the landlord; it certainly had not been brought home from the point of view of the nation; and it was important they should put aside that feeling of easiness, perhaps, towards the bad farmer which had hitherto been allowed to exist. It was, doubtless, sad that some of the older farmers should have to give up their farms, but if they were unable to farm the land properly, it was really no kindness to them to allow them to continue, and it was a

great injury to the nation if they were allowed to stay in possession of their farms. Every help should therefore be given to the executive committees to enable changes to be made.

One word more he would like to say, which was that, as a body, as Members of that Institution, they should do all in their power to help the executive committees. In the exercise of their profession they had great opportunities, and could help enormously in the duties which the committees had to perform if they made up their minds to look with sympathy on what was being done. Many of them knew that although the ploughing up of grass land was in many cases an economic proposition at the present moment, other cases occurred where it was not; in spite of that let them try to persuade property owners to make the sacrifice. In this war landowners, by giving up sons, had done magnificently, and every class had fought and done nobly. But it was a curious thing that when asked to plough up a bit of grass land, some landowners seemed to think it was too much to expect. The position was extraordinary: he had been astonished to find landlords who could not realise that it was but a little thing they were asked to do, to make a pecuniary sacrifice by allowing land that was not being cultivated to be brought within the general scheme and used for growing wheat. Members of The Institution who were land agents were responsible for the management of a great part of the agricultural land of the country, and he hoped they would urge landowners to seize the opportunity of proving that the ownership of land was in good hands. If they placed obstacles and difficulties in the way of food production by objecting to the ploughing up of grass land, they would do their class an irremediable injury and would

provide reason for the argument against ownership put forward in some quarters. Such a course of action would, in the long run, be fatal to the interests of agriculture. Let them all do their best, each in his particular way, to impress that view on landowners, and on farmers also for that matter, and seize the opportunity of helping the country by not creating any obstruction.

Mr. H. J. ELWES (Visitor), as a practical farmer of forty years' standing, desired to say he thoroughly agreed with what the last speaker had said. Mr. Strutt, alone, had discussed the economic side of the question, which undoubtedly was important. There were people who, not knowing the difference between good and bad land, did not always realise that there was no margin of profit in producing corn on a great deal of the poor land of England. There had been none since 1879, and he was afraid, having regard to the cost of production, that would continue to be the case, even at present prices. Of course, where one had to deal with good or second-rate land, or land easily broken up, however poor, there might be a greatly increased production of corn even now at a profit, but there would, undoubtedly, remain a large quantity of land which, either on account of its hilly nature, its extreme variability, or because it was sour, heavy, clay, or very stony, or for some climatic, geological, or other reason could not at this moment be made to pay to plough at present prices. In his county there was now a great deal of grass which had been since the seventies or eighties occupied by farmers who made a living as best they could. Good farmers no one would ever call them, but somehow they managed to scratch a living from the land and earn sufficient to pay the

rent. Now they were called on to plough it up without the probability of receiving the slightest benefit. It was unlikely that it would be properly ploughed up by motor ploughs. The existing occupiers could not do it, but if it were done at the right time by men and horses, who could do it better if not so cheaply, it would produce a considerable crop per acre. There had been a good deal of discontent, and these farmers were now appealing to the Agricultural Committee not to force them to plough up more than one-fifth of those grass farms.

Everybody knew that one could feed a greater number of cows on a farm containing a certain portion of arable. They had only got to go to Denmark to see how, with cheap labour, light land, and a summer which is short but certainly warm and favourable, one could produce more milk and pig meat under arable than we could ever hope to do here at a profit. That he had seen himself. When a Danish farmer came over here and was astonished that we did not plough up the land, he was almost always ignorant of the cost.

The question of economy was one which ought to be considered, but, as Mr. Strutt said, was not considered at present by the better class of landowner. It would require compulsion and more drastic use of power than most of the county committees would be prepared to take to compel the breaking up of grass land by those who had been brought up to live under the bad conditions of the eighties and nineties, on the principle that it was better to produce a little at a profit than a great deal at a loss. The speaker came from a district where there were large estates, on which during the period of depression not one farm could be let. On one of these the landowner had recently given notice to four tenants on the ground of bad farming, but if the

tenants went he would probably have to occupy the farms himself.

He had no doubt that with the present prices for stock, the difficulty of getting labour or horses and implements, any owner of poor land with vacant farms would have to farm the land himself, and would find himself in difficulties which the occupiers of really good land did not realise. Unless the owner realised that for national purposes it must be done, even at a loss, it would not be done at all. As it had got to be done, the Government should be made to realise that it was being done, not for the owner's profit, but because the owners looked at it in exactly the same way as they and their relations had done, and believed that in addition to what they were giving in blood and flesh they must also give in land.

Mr. EDGAR HARPER (Fellow) thought there was something still to be said in support of the vote of thanks which had been so well moved and seconded. He was not surprised that the mover was under the impression that Mr. Raffety had transferred his services from the Valuation Department to the Food Department, but that was not the case. The Institution ought to know that Mr. Raffety was doing double work. Where he had found time to write his Paper the speaker did not know. One fact to be borne in mind was that Mr. Raffety had been a district valuer for seven or eight years, and had in that time acquired an unequalled knowledge of the land and its records, and therefore the conjunction of the two offices had been of special advantage to Bucks. That, of course, was only typical of what had occurred in most of the agricultural counties in England and Wales. The fact that the Valuation Depart-

ment had, in regard to every farm in the country, a record of the particulars and boundaries, and the nature of cultivation at the time of inspection, had saved the Food Department and the Agricultural Executive Committees an enormous amount of work. He was sure that the district valuers who had been privileged to take part in that work were thankful to the Commissioners of Inland Revenue for giving them that opportunity, and they had thrown themselves into it with heart and soul.

Captain A. B. THORNTON (Fellow) desired to congratulate Mr. Raffety on the Paper. With his congratulations he also thought he was entitled to combine those of a number of other friends of Mr. Raffety who were at the present moment serving elsewhere. The Paper had been most refreshing to listen to, for it aroused that enthusiasm which he thought we needed in these days. The one point he wished to notice was that Mr. Raffety expressed some anxiety with regard to the limitation of the powers of the executive committees. With that he sympathised. If a man were given a job, and this was a very big job indeed, he must also be given the power to see it through. If he were to be hedged round with other committees and all sorts of restrictions, the work could not be done. What had been done in Buckinghamshire during the last few months by Mr. Raffety and his committee was done largely because of the wide powers which he was sure were fairly and equitably used.

Mr. STANLEY HICKS (Professional Associate Member of Council) wished to join in the vote of thanks because he had had the pleasure of appearing before Mr. Raffety's

committee in Buckinghamshire. He had been impressed by their genial and practical manner in dealing with various cases that had come before them. Further, he thought the way that the head committee had instituted the various sub-committees had been most satisfactory, and had produced good results.

The motion was then put and agreed to with acclamation.

Mr. HAROLD V. RAFFETY, in acknowledging the compliment, said he felt the Paper he had been called upon to write was a most difficult one. He felt personally indebted to those gentlemen who had been good enough to speak, and he had been extremely interested in some of the remarks that had been made. If he might say so, Mr. Fisher had unintentionally robbed him of half his pleasure, but Mr. Harper had explained the position in regard to that matter. His old friend Captain Thornton—who had come directly from the trenches—had exactly described the position in this matter. He (the speaker), though a comparatively young and fit man, had not been called to the trenches, and therefore, if he had now to work harder than he had ever done before, it had only been a pleasure.

He had been particularly interested in Mr. Turville Brown's remarks on the labour question, especially in regard to the prisoners, and he would certainly bear them in mind. In his district there had been trouble with regard to game, and that perhaps had led to his comments on that subject. Mr. Strutt had finished on a theme which was the one he would have wished to finish on that night, and it was only lack of time that prevented him from further replying to the other speakers. He would

use the last moment he had to ask them, as Members of a great Institution, holding great power for good or ill, to give every assistance in the matter. The serious nature of this business was, not as to its cost, but whether we could feed ourselves in 1918, 1919, and the future, and therefore he appealed to them again to help the executive committees, who had a thankless task, and were in a difficult enough position even now, feeling sure the profession could and would give them the greatest help of all.

The PRESIDENT, in closing the proceedings, said he need not say that Mr. Raffety's Paper was a very useful addition to the literature of The Institution. It was not only interesting and historical, but it was non-controversial, for which reason it had not given rise to a keen discussion and the airing of adverse opinions from the speakers that evening. Speaking for the Members of The Institution, he assured Mr. Raffety that he could rely on them doing everything that lay in their power to assist the agricultural committees.

THE EMPLOYMENT IN THE SURVEYORS' PROFESSION OF MEN DISABLED IN THE WAR.

By L. G. PILKINGTON (VISITOR),

Representative of the Y.M.C.A.

*Read at the Ordinary General Meeting of THE SURVEYORS'
INSTITUTION, held on Monday, 14th January, 1918.*

ARTHUR LYON RYDE (President) in the Chair.

It is no surprise to me that the patriotism of your Members has led, not only to a large proportion of them joining some branch of H.M. Forces or undertaking work of national importance, but also to them allowing, and even urging, as many of their staff to follow in their footsteps as could possibly be spared. I fully realise that Members will feel they are bound, as far as their own staff are concerned, not to take any steps that will prejudice in any way the possibility of their being able to take back into their employ any of those men who wish to return after they have finished their time in the Navy or Army. Some of these men will be unable to come back; some will be quite unsuitable, owing to their disabilities, for their former positions; some, probably only a few, will not wish to return, having perhaps

made friendships which will induce them to take up some other employment, or having by their contact with colonials acquired a very strong desire to emigrate. This will leave a certain number of vacancies to be filled. Above all this, Members of your Institution must continually come into contact with employers of all kinds, and it is to them I specially appeal to-day to ask them to bring this problem of the employment of the discharged men as prominently and effectively to the notice of those employers as they possibly can.

For this purpose I hope the following facts, which I shall try to place before you as briefly and clearly as I can, will be of service.

Men no longer fit for further service in the Army are discharged from two sources. Some men have been tried at work in the Army which their health has prevented them carrying out. These men have then been tried at less arduous work and still it is found that they cannot fulfil their tasks, and a medical board finally decides that they must be discharged. These men are sent to certain camps according to which command they are serving in England. Other men through illness or wounds find their way into hospital, and they appear before medical boards at intervals. Finally, a medical board decides that they will never be fit enough to do work in the Army.

In both cases they are allowed twenty-one days after this decision has been made before they are supposed to leave the camp or the hospital. (In certain cases they urge that they will be much better off if they go home at once, and permission is sometimes granted.) This period of twenty-one days is to allow the man's Army papers to be got ready, his pay settled and forwarded to his home address, and the

question of his pension gone into and settled, at any rate for the next three months. (If he goes home before the expiration of this period, he is liable to find himself in difficulties because no official body has any power to help him, as officially he ought still to be in camp or in hospital. Although the man has got into difficulties through his own fault, yet it is quite possible to come across men under these circumstances who really need help and deserve it.)

If on a man's arrival home at the end of this period of twenty-one days his pension papers have not yet arrived, he is entitled to an allowance of 14s. a week until some decision has been made. If a pension is eventually granted, it will date from the time of his leaving camp or hospital, and this 14s. a week will be deducted from the sum due to him. The majority of men, I should say, do receive a temporary pension or gratuity. Gratuities are largely given to men who suffered from some disability before enlistment but whose disability has been aggravated, though not created, by their period of service.

Pensions are never fixed when a man first leaves hospital. They are granted for a period of three or six months. At the end of that time a man has to appear before a medical board again to see how far he has recovered from his disability. The medical board assess the degree of disability by stating that the man is 20, 30, or 40 per cent. up to 100 per cent. disabled. The authorities at Chelsea, acting on this report from the medical board, and taking into account all the other circumstances, assess the pension. The pension paper (or ring paper, as the man usually calls it) is issued from Baker Street, and the money is made payable at the post office nearest the address at which the man has

stated he is going to live. Attached to this paper will be found a pamphlet which sets out the usual pensions payable for the various degrees of disability. The total disability pension for a private is 27s. 6d. a week. If he has children he receives in addition to this 5s. for the first child, 4s. 2d. for the second, 3s. 4d. for the third, and 2s. 6d. for each of any others.

After a man has been examined two or three times, it is usually clear to the medical board either that he is quite as fit to earn his living as ever he was, or that his disability has reached that stage when it is not likely to get any better. His pension is then fixed. Once this has been done no medical board is allowed to inquire into the man's earnings.

If a man feels that this total disability pension is quite inadequate to keep his home together in the way to which he was accustomed before the war, he is entitled to put in a claim for an increased pension in proportion to his pre-war earnings. For this purpose he will have to produce some satisfactory proof as to what his average earnings were prior to the war. In any case 75s. is the largest pension which a man can obtain.

For any rank a man has held his pension is proportionately higher.

If a man is in any difficulty whatever about his pension, he should apply in the first instance to his Local War Pensions Committee, whose address he can always get from the post office nearest where he is living. If he is not satisfied with the action taken by his Pensions Committee, or if anybody interested in his case is not satisfied, he can always write to the Ministry of Pensions, Westminster House, Millbank, S.W. 1.

The Local War Pensions Committees are also responsible for providing whatever treatment is required to

help a man recover from his disability whether caused by wounds or illness. With the very large number of War Pensions Committees up and down the country, naturally some are far less efficient than others, and where the treatment required by a man is in any way out of the common, pressure is sometimes necessary before a committee can be induced to provide it for him. Outside help coming from a man who has a certain amount of influence is often a great boon to men in these circumstances.

Pensions Committees are also responsible for providing training for those men who wish to undergo it and are capable of being trained and are eligible. Their eligibility depends on their being in receipt of a pension of at least 5s. 6d. a week.

In order to co-ordinate training, the country has been divided into thirteen divisions. In each of these divisions the Local War Pensions Committees are grouped together for the purpose of training only. If a man is keen to be trained and cannot obtain the necessary information about the training available from his Local Pensions Committee, or is in any way dissatisfied with the answers given him, he can always appeal to the Training Committee of his area. The address of these committees can be obtained from Westminster House. But here again friendly help and advice from someone who knows the man, and knows the details of the actual work for which he wants to be trained, can often be of tremendous help, not only in advising the man, but also in seeing that the committee send him to the best centre to be trained. In a great many cases professional men with their special knowledge of a certain kind of work will be of great assistance to Pensions Committees, both in helping them to decide whether it is wise or not to

train certain men, and also in helping Training Committees to start and run courses of training for those men for those particular openings.

Men fit by either education or social standing to be trained for professions will be found in quite large numbers in the ranks, and these remarks which I have just made apply to officers as well as to men, but in the case of officers their pensions and their training are dealt with direct from Westminster House. They do not go, as the men do, to the Local War Pensions Committees.

During the period of training a man will receive a total disability pension of 27s. 6d. a week. This includes whatever pension he may have been in receipt of before, and he goes back to this old pension again as soon as this training is completed, unless in the meantime it has been increased or reduced by a medical board. On the satisfactory completion of his training, he receives a bonus amounting to 5s. for every week that his training has lasted. He is also entitled to an allowance for every child on the same scale as mentioned above, and to his expenses for travelling to and from the place at which his training takes place. If he has to go away from his home to be trained, his wife receives an allowance of 13s. 9d. a week. A single man or married man without children will have a very hard struggle. At the same time it is quite often the young married man who is the most likely to make good after he is offered training, and, therefore, a little friendly assistance to some of these men will not only help them but will also help the profession they enter and the State, because both professions and the State will, after the war, need all the skilled men they can possibly get.

Then comes the question as to what disabilities a

man can suffer from and yet carry out efficiently certain work, other things being equal. I have drawn up a schedule showing the different occupations with which it appears to me Members of your Institution are likely to come into contact. Against each of these occupations I have shown, as far as our experience goes, the disabilities a man can have and still carry out the work quite efficiently. I do not suppose for a moment that this list of occupations is complete for the disabilities shown, and we shall be very grateful indeed if your Institution can see their way to appoint, perhaps, a small committee to go very fully into this matter, and improve this schedule very considerably. It might then be circulated among those of your Members interested in the subject. When an employer is approached with a view to urging upon him the importance of employing as many disabled men as he can, it is naturally of very great importance to be able to prove to him exactly what disabilities a man can have and yet do the work that has to be done. Such a schedule prepared by Members of your Institution, and backed by their authority, would naturally carry great weight with your profession and all those with whom they come in contact.

May I now turn to the way the work is carried on in our Special Employment Exchanges in London. The War Office sends to the Ministry of Labour particulars of every man discharged from the Army. These particulars are distributed by the Ministry, *viâ* the Divisional Offices, to the Employment Exchange nearest to where the man has stated he is going to live. The Manager of the Exchange sends an invitation to the man to call if he is seeking employment. If no satisfactory answer is received to this letter in six days, the particulars are sent on to us. A letter is at once sent

to the man inviting him to call and see us if he thinks we can be of any service to him in obtaining employment, giving him information about his pension, about hospital treatment, or about training for a skilled trade. By means of an alphabetical and date card index, his name is kept before us until either he calls, or we are satisfied that we can be of no further use to him because he has obtained employment through other means, or absolutely fails to reply to any letters sent to him, or letters are returned to us through the dead letter office. In a few cases we get a letter from a relative saying the man has died.

When a man calls, he is met at the door in as friendly and unofficial manner as possible, and asked to fill in a form. This form is so arranged as to give us, when correctly and completely filled up, full particulars of his home circumstances, that is to say, the financial weight he has to carry, his Army service, the reason of his discharge from the Army, whether wounds or sickness, with the resultant disability (these three together showing what effect his Army service has had on his life), his length of service abroad, and the country or countries in which it took place, his industrial experience before enlistment and since discharge, the employment he is seeking and any special qualifications he thinks he has for it, private references in case he is seeking a position of trust, and any special remarks that may be of use to us. No question is ever asked unless the answer will help us to be of use to the man. After the form has been checked through, the man is seen by a Y.M.C.A. interviewer. For this work we have endeavoured to get men with a wide knowledge of mankind, gained, if possible, through social service of some kind, as that usually gives knowledge of a man's home,

his temperament, outlook on life, initiative, education, &c., as opposed to mere industrial experience. If these interviewers have some knowledge of several kinds of occupations all the better, but it is far easier to teach an interviewer what it is necessary he should know about occupations than to give him a real knowledge of men. These interviewers are naturally the real strength of any successful work we may be able to do. The men that come to us are mostly re-starting in life. If the interviewer can really size them up correctly, he can explain to them fully just those kinds of occupations at which they are likely to do really well. At the same time he has to take into account a man's disability, or rather the effect of it, both now and permanently. With information and help such as this, a man should be able to choose, with some measure of success, jobs for which he is best fitted. Quite a large number of men are discharged with neurasthenia.

The effects produced by neurasthenia on men discharged from the Navy and Army, as far as employment is concerned, are that a man loses a very large amount of will power. He finds it very difficult to make up his mind; he lacks concentration; his character appears to be entirely changed; he lacks initiative; he has no self-confidence at all. This means that, from the interviewer's point of view, it is very difficult to get him to decide what kind of job to try and tackle first; he is always so certain that he cannot do it. From the employer's point of view it means that he cannot stand long hours; he is to be carefully, sympathetically, but firmly handled. If he gets at all hustled, or if his work is much criticised, he is very apt to stay away, because he simply cannot face the work the next morning.

The two most important things are to find him work that he feels he can do and that is thoroughly congenial to him. Given a month's steady work with these two conditions satisfied, more will be done to help him towards recovery than any form of treatment. If an employer will only do this, he will have not only done a real kindness to the man himself but will in very many cases have obtained a valuable servant.

The doctors nearly always recommend light outdoor work in the country. In the first place this is often difficult to obtain; in the second place I very much doubt whether to a man born and bred in a town life and work in the country would ever be congenial. I am quite sure that it is much easier to obtain congenial work for these town-bred men in a town than it is in the country, and I cannot help feeling that in a great many cases, because it will be congenial, it will help them far more effectively than work in the country.

After the kind of occupations a man had better go in for has been decided, he is shown the actual vacancies on our list in each. After deciding which vacancies he would like to apply for first, he is given cards of introduction to take to each employer. The system followed is the same as in an ordinary Exchange.

Where a man's previous industrial experience, in spite of any disability from which he may be suffering, points without doubt to the desirability of his taking up some particular kind of occupation, his form is classified according to that occupation, and if he returns to the Exchange at any time he is interviewed by the Ministry officials. This section consists largely of men who have been in some form of skilled or semi-skilled work. In a great many cases, probably more than half, the man's disability is the governing factor in deciding what kind

of work he can and should go in for. In these cases he is classified according to his disability. A schedule has been drawn up, which is available for the inspection of your Members, showing the system of classifications we have adopted so far. These men, together with those wishing to learn a trade, always return to Y.M.C.A. interviewers.

Where a man is so disabled as to be always seriously handicapped in obtaining and keeping suitable work, his name is put on an alphabetical and date card index. By this means we keep closely in touch with him until he gets work suitable to his disability. Afterwards we write to him at longer intervals, say, of three or six months, to make certain that he is still in such employment and to ascertain if there are any other ways in which we can be of use to him. We hope and intend to keep this up for some years, especially in times of any general slackness of trade, when these men might be in danger of being out of work. As a Special Exchange, though ready to see any discharged man, we confine our special attention to the badly disabled, because they have to be treated, each one separately, and cannot be in any way grouped. Our endeavour is to obtain for each of these men just that job whereby he will be able to render himself of such value to his employer as to make his job a permanent one. On the return of their members and committeemen, when organisations resume their pre-war activities, we hope to be able to offer to put these men in touch, if they wish it, with a brotherhood, a friendly society, a choral society, a social club, an athletic club, a church or a chapel, or whatever would help them most to spend their leisure time in a sound and healthy way. By this means they should be able to settle down in civilian life again with as little per-

manent damage caused by their Army experience as possible.

In these Special Exchanges we are partners with the Ministry of Labour. This means that the men have all the advantage of an ordinary Exchange. In spite of many complaints these advantages are many and real. All we have been able to introduce is, perhaps, a more friendly atmosphere, the trust in us that our work amongst the troops has created, the advantage to be gained from the special interviewers, with their wide knowledge of all kinds of men, and the special system of getting and keeping in touch with all the men who need special help. There is a complete system of Exchanges, with agents in the smaller towns and villages, throughout the country. By this means it is possible to put a man in touch with an agency likely to be of service to him in finding employment wherever he wishes to go. Trades are being organised by the Ministry by means of "Trades Advisory Committees." These committees are drawing up training schemes for discharged men and regulations for their entry into the trade. "Local Technical Advisory Committees" are being formed to work as sub-committees in any district where a particular trade is carried on to any extent. The Ministry has set up "Local Advisory Committees" in connection with every Employment Exchange or group of Exchanges throughout the country. These committees are for the general work of the Exchange. It is hoped that every committee will appoint a sub-committee to deal with the placing of men disabled in this present war. On and round those sub-committees it is hoped to group all the work to be done in placing all disabled men so as to avoid all overlapping with its resultant waste of effort and inefficiency. All these committees

are composed equally of masters and men with, in some cases, a few others added. It will thus be seen that the machinery for tackling this very difficult yet most important problem is steadily coming into existence. If the *personnel* of the committees is as good as the machinery, the results should be excellent. Personally I am very hopeful. What we ask is that the placing of these disabled men in employment shall be treated as a special problem, and that specially picked men shall be specially trained for the work. The officials working with us in the Special Exchanges are doing excellently. They have readily adapted all the best of the existing methods to the special needs of these men. They are tackling the problem as it is, and are always ready to face the extra work that is often required.

We also work in conjunction with the Ministry of Pensions, especially the London War Pensions Committee. Should a man need help or advice about his pension or treatment, he is at once put in touch with the branch of the Pensions Committee for the district in which he lives. We try to keep in touch with these men until we are satisfied that they have received all the help to which they are entitled. With the help of the Trade Advisory Committees and the Local Technical Advisory Committees, the Pensions Committees are steadily bringing into being practical and efficient schemes of training. This has taken a long time because the Unions were rightly anxious to guard their trades from any influx of unsuitable and badly trained men, both for the sake of the trade and of the men who wished to be trained. No man is eligible for training unless he is in receipt of a pension of at least 5s. 6d. a week. We reckon that only 10 per cent. of such men at the most are worth training, because a man, to have a reasonable chance of succeeding

in a skilled trade, must have a certain amount of education, initiative, and general ability, the right temperament, and the right turn of mind for that trade. A man may make an excellent clerk but a very poor mechanic. He may make an excellent draper but a poor chauffeur. Therefore these men must be picked with very great care. Whenever we come across a man who seems at all likely to make good in a skilled trade, we at once explain to him the particulars of any training scheme within our knowledge likely to appeal to him. We point out the advantage a skilled trade offers both as regards permanency and remuneration. If he wishes to go further into the matter we at once put him into touch with his Local Pensions Committee, with whom rests the responsibility of seeing if he is eligible. If he is, he is passed on as a rule to the Local Technical Advisory Committee for the trade for which he wishes to be trained. Through them he passes on to the class or firm responsible for the training, and so into the trade itself. This progress offers many chances for delay, so we keep in touch with all these men, whether badly disabled or not, until they are successfully launched in the trade itself and have been recognised by the union as skilled men. It is to be hoped, and it is certainly the wish of the Ministry of Pensions, that all Local Pensions Committees will join the sub-committees of the Local Advisory Committees set up by the Ministry of Labour which I have previously described.

We are trying to place square pegs into square holes. Many of these men are so disabled that they are not even square pegs; they are pegs of most irregular forms. We believe that holes exist in ordinary industry for the great majority of these. It is much wiser to try and get men into jobs in ordinary industries than to start all

kinds of special ones. Therefore we hope to set up these Special Exchanges in every town large enough to need one. Where the town is not big enough to need one, we hope the work will be done through the special sub-committees. What is wanted is that every employer whenever he has a vacancy of any kind, whether for a managing director or a floor sweeper, will himself go into the question and see if he cannot possibly manage to employ a disabled man. If a disabled man cannot fill the actual vacancy that has occurred, maybe the staff can be so rearranged as to make a vacancy for such a man. We ask that all such vacancies shall be notified to the Special Exchanges where they exist, and otherwise to the sub-committees. If they can be reserved for discharged men for, say, a week, so much the better. We ask the help of every Member of this Institution in bringing this matter to the notice of every employer with whom they come in contact.

We also ask the help of Members in the interviewing that has to be done at these Special Exchanges and the sub-committees. Canvassers of employers are badly needed. A Member might either canvass those employers in his own particular branch of his profession or become a general canvasser. All he needs to acquire is a knowledge of what disabilities a man can suffer from and still carry out each kind of work efficiently. In training for this work and as interviewers we shall be very glad to offer every facility we can. Part time help is valuable where whole time help is impossible. Other Members may be of greater service in creating and supervising schemes of training through Pensions Committees.

The problem is a very urgent one and very difficult. The disabled men come from all ranks, Generals to Privates. They are of all kinds, from labourers who

cannot write their own names to men who have gained the highest academic honours at our universities. They come from all parts of the world. We know we can count with certainty on the help of every Member of this Institution once he knows where the services he can render will be of most use. If we can be of any help to him in attaining that knowledge, we are at his disposal. Our offices are 102, Dean Street, W. 1., just off Oxford Street.

I am most grateful to The Institution for giving me this chance of laying before you this problem as we see it at present, and the lines along which we feel solutions must be sought. My one excuse for doing so, and the only reason for attempting this work, is the need of these men.

The PRESIDENT, in calling on Mr. Corderoy to move a vote of thanks to Mr. Pilkington for his valuable Paper, remarked that though the attendance was small, a larger number of gentlemen than usual had sent in their names as wishing to take part in the discussion. Not only would that fact be a satisfaction to the author, but also he would know that his Paper and the report of the discussion thereon would be circulated by means of the *Transactions* all over the kingdom.

Mr. G. CORDEROY (Member of Council) moved with the greatest pleasure that the best thanks of The Institution be accorded to Mr. Pilkington for bringing the subject of the employment in the surveyors' profession of men disabled in the war so comprehensively before them, and for the detailed information he had given them. The President had referred to the smallness of the attendance that evening, but that assuredly

was not the measure of the interest taken by The Institution in the matter; the title of the Paper sufficed to guarantee an interest in the subject. Probably all present and a great number of other Members of The Institution had served or were serving upon committees (unconnected with The Institution) dealing with the reinstatement and employment of men discharged from the Army as a result of the war, but he was sure that the Council would welcome the suggestion which Mr. Pilkington had made to add yet another committee to its many to deal specifically with that subject. They might be able through a Central Committee to render help by nomination to the Local Advisory Committees, with whom, of course, the most important part of the work would rest. Then there was a society, about which they did not hear very much inside those walls, the Architects and Surveyors' Approved Society, of whose management committee he had the honour to be chairman, which also had a benevolent fund attached to it. This society had rendered effective help with regard to certain classes of cases brought before it, and speaking on its behalf he could say that they would be very glad to do all that they could to co-operate.

Their one object was to assist the members of the professions who needed help. But there was one *caveat* which he personally felt must be entered against an underlying suggestion in the Paper, *i.e.*, that it was possible to train discharged men, without previous training or experience, for the highly technical work which Members of The Institution are called upon to perform. He hoped and believed that they would have no difficulty in finding work for all qualified surveyors who were Members of The Institution, or whose training had been suspended by the war, and in assisting them

to continue their training, but he did not think they could give very much help in the way of direct entry into the surveyors' profession to men without previous training. Such help could not properly be looked for from The Institution. There was probably more to be done by means of subordinate employment, by land agents and others, who were requiring and would be requiring labour for various purposes. He referred more particularly to a subject with which he was very little in professional touch, but in which in common with other Members of The Institution he was interested, *i.e.*, the forestry programme proposed by the Reconstruction Committee, which seemed to him to provide opportunities for employment. One thing he was sure of, and that was that no young man of capacity, character and determination, even though he were partially disabled, need long be out of employment when the war was over.

He was one of those optimists who looked forward to a great rush of employment hereafter rather than a dearth of it. It depended, of course, on two factors which were present in the minds of all of them; first, that everyone was willing to do his or her utmost, and, secondly, that the employer was willing to pay the full value for work done. It was possible that employers and other people also were learning those two very essential points, which were being driven home in various ways, and were disposing of some empirical theories in vogue before the war.

In conclusion, he might confidently say that any help which The Institution could render through its Council or individual Members to promote the best and real interests of those to whom they all owed so much would be readily and promptly given.

Mr. M. C. DUCHESNE (Fellow) said he had great pleasure in seconding the vote of thanks to Mr. Pilkington. Papers of the nature they had just heard read were extremely valuable in preparing the ground for all those new developments which Members wished to assist. Many schemes which had been brought forward in the past had been rather prejudiced because the ground had not been carefully prepared, or because there had not been sufficient discussion or consideration of the schemes before they were launched.

The Paper dealt with the employment in the surveyors' profession of men disabled in the war. The direction in which he wished to say a few words would be as regards employment in the country districts. He would first like to associate his remarks with those of Mr. Corderoy in suggesting the use of great caution before trying to get men to take up work requiring not only technical training but considerable practical experience. He took it that the many men lately employed in the Land Valuation Department who were Members of The Institution would have the first claim. He wished to emphasise the importance of the point taken in the Rural Report issued by The Institution, which had met with a most favourable reception throughout the country and had done a great deal of good in influencing proposals relating to rural developments. The line which was then taken was the eminently sound one that any possibilities there might be for employment in the country depended entirely upon the prosperity of the rural districts. They might bring forward any schemes they liked with reference to agriculture, forestry, or other rural development, but until they had insured prosperity in those industries all their schemes were bound to fail. The proper policy

to adopt was to try and create good conditions so that the men might be absorbed rather than that they should be forced in any direction. The prosperity, therefore, of the industries, which he suggested was the essential thing, depended on many things, and he would like to impress the fact that the most important factor was a broader outlook by everybody connected with rural affairs.

He would not touch on agriculture because he was asked to refer more particularly to another branch of rural development, but which was very much dove-tailed in with agriculture. He would like to point out again that they could not take any one of those rural problems by itself because they were all so interconnected. Whether they talked of agriculture or forestry, one was dependent very much on the other. Forestry and matters connected with the woods provided winter work and dove-tailed in admirably with agriculture, for which men were required during the rest of the year. The main point was, therefore, that those who could come in for professional or other employment should have a training of a general nature rather than specialise in any particular work. It was always most dangerous to attempt to specialise before getting a general grasp of the problem. They could not take one branch of rural development and specialise unless they had first got a general grasp of all rural life.

Mr. Corderoy referred especially to the forestry report just issued. He (Mr. Duchesne) could not, of course, go into that report except to point out what would be the general requirements of the nation after the war, so that they might be able to judge what possibilities there were for the employment of disabled men or others in forestry. They had to wait for a

definite pronouncement of the Government's policy, but some sign of this was given in the recently issued report of the Reconstruction Sub-Committee on Forestry providing for an additional area of 1,770,000 acres to be afforested. Whatever that policy might be—and they had had many disappointments in the past—he did not think that any Government dare take the risk of again leaving this country short of timber. It was not a question now whether forestry would pay after the war, but the defence of the realm. They must never risk this country being short of timber again, and in case of emergency they must be able to release the ships used for carrying timber and fall back on this country for pit-props and other timber necessary during a war. That would naturally entail an ambitious programme, and it would necessitate the employment of a large amount of skilled and also unskilled men. But what the prospects might be for professional people would depend very largely on other rural developments as well as forestry. The forester who hoped to be in receipt of a good income would naturally have to possess high technical training in forestry and have had considerable practical experience of it. Experience of that description could not be acquired in five minutes, but he thought that there would be increasing opportunities for absorbing men for forestry in various directions. They should prepare schemes of a general character and lay down a policy, but he hoped that there would not be too much quibbling over comparatively unimportant details, and that they should take the general scheme and judge it on its merits.

The start in these cases was always difficult, and whatever prospects there might be for Mr. Pilkington's suggestions, he would like to urge the importance when

men were to be discharged from the Army that they should be trained for other work in the same way as they had been trained for the Army. He was sure that Members of The Institution would be delighted to assist in any of these directions, and he was quite certain that Mr. Pilkington could rely on The Institution, both individually and as a whole, to assist him in his work.

Mr. J. H. SABIN (Member of Council) said they must have been struck, in listening to Mr. Pilkington's Paper, with his account of the extraordinary problems that had been raised by the present social upheaval, and also with the consistent efforts which were being made in so many directions to overcome the troubles that would be experienced after the war was over. These troubles would not end then, and they would have problems to deal with which a generation ago they would hardly have deemed possible. He thought, also, that one could not but be struck, in listening to Mr. Pilkington's Paper, with the fact that religious enthusiasm was not entirely divorced from business aptitude and business arrangement. It appeared to him that many of the suggestions Mr. Pilkington had made were such as would commend themselves to the most businesslike of men. Unfortunately they had not yet had the opportunity of examining Mr. Pilkington's schedule of occupations, but he understood that a copy was available for Members to study.

Mr. Duchesne had mentioned one very important provision of employment in which he thought men would find aptitude. He (the speaker) did not realise or understand that Mr. Pilkington suggested that any men discharged from the Army could immediately be used for, or be trained to be used for, the surveyors' pro-

fession or try to enter the Royal Institute of British Architects; but what he did apprehend Mr. Pilkington to suggest was that there were a great many trades and occupations into which they might be able to guide men who otherwise were unable to find employment.

He could give an instance himself where a man discharged from the Army with his nerves entirely shattered, absolutely incapable of sleeping in London, was sent into the country to be treated. He found him employment with the village carpenter, and the man was now recovering his usual state of health, and not only exercising his trade but was also acquiring very rapidly a love for provincial work, and quietly settling down to such arrangements as doubtless would ultimately restore him to perfect health. He was not quite sure that the town man was always unsuited for the country, and he gathered from the experience of the last few years that many town men would be only too glad to escape into the quiet and peace of the country village. He should like to have heard from Mr. Pilkington of any special cases of men like themselves in professions to whom actual assistance had been given. One important omission from the Paper was a statement of the work that had already been done. In conversations with Mr. Pilkington some weeks ago he gave them figures showing the number of cases that had been referred to his association, the number of cases that had been discharged weekly from the Army, and other particulars which perhaps he would be kind enough to give them in a note or addendum to his Paper, or when he finally replied.

Now with regard to the men who were discharged and the work they might be required to do, he was not quite sure that a man must necessarily go back to the

trade or profession which he forsook. It was wonderful how men would adapt themselves to circumstances. He had in mind one man who had never crossed a horse in his life, yet became such an expert rider that his riding-master said his only trouble was that he did not know how to fall off. Unfortunately the man was transferred to a cycle brigade, much to his disgust, and finally was wounded, and was hoping to be discharged from the Army. With regard to that case he would like to say, though perhaps it was almost an offence against "Dora" to refer to the matter, that men were not getting their discharge until considerably later than they ought to receive it. He understood that there was a large camp in one division where there were some thousands of men who had nothing whatever to do. The difficulty appeared to be to deal with them with sufficient rapidity. He thought it would be well to realise the fact that we wanted men, not only abroad, but also at home. At present men here were as valuable as food, and they wanted to get back those who were useless at the front as fast as possible to fill positions in which they might do useful work.

Then there was another point which occurred to him, and that was that many men would go back to other employment than the one they had left. There was particularly a great demand for men with some experience of mechanics, and there seemed to be a large number of such men discharged from the Army, motor drivers and others, who could be excellently employed on farms, having regard to the enormous increase which was likely to take place in the use of tractors. Now that was a training which men would have partially received, and it was quite certain that the motor tractor had come to stay. Those were the points which he thought

at least deserved attention, but he would not deal with them further as there were other Members who were anxious to speak. Perhaps they would touch upon matters which he was compelled to omit. One could raise questions with regard to the comparative value of the pension as compared with the pay a man was receiving, and perhaps Mr. Pilkington would tell them how the two figures compared. How did an allowance of 14s. a week compare with a man's pay and the value of his rations? There was one other point. He was wondering whether it was possible to circulate a list of men who were wanting particular situations so that it might be supplied to leading Members of The Institution. Of course, as Mr. Corderoy had stated, they could hardly expect The Institution to admit into the surveyors' profession men who had had very little training for it, but there was a large number of trades the borders of which were touched by land agents and surveyors, and they might be able to render assistance in that direction.

Mr. C. F. SLATER (Fellow) said he was a little nervous in speaking after the eminent Members who had preceded him, because he did not know that he could follow them quite on the same lines. He felt that the greatest caution was necessary in introducing to the surveyors' profession men who had not been accustomed to it, but at the same time he would not like the Members of The Institution, or the public generally, to run away with the notion that they were an overcrowded profession. There were far too few qualified surveyors in the country, and three or four times the number of surveyors could be employed if the men could be found to take the jobs.

There were two or three points in the Paper to which he would like to refer. On page 88 Mr. Pilkington gave particulars of the questions which the men were required to answer when they applied to the Y.M.C.A. He would suggest that those questions be set out in a form which would be handy for Members to refer to when dealing with any cases which came before them.

Mr. Pilkington's remarks on neurasthenia were very valuable and useful to anyone acquainted with the matter. It was very gratifying to know that the Government departments were in some way looking after these men, but there was something lacking about a department, a certain diffusion, long benches, long waits—it was just a department, and there it was that the Y.M.C.A. was coming in to do useful work in supplying the human element.

He took Mr. Pilkington's suggestions for surveyors' help to disabled men to be something like this—that they could supply outside help after the Local War Pensions Committees had failed to do so, that they could help in the committees themselves, that they could indicate special work for special disability and keep a watchful eye on other jobs bordering on their own, and then, which was rather important, train and admit disabled men to their own profession. He thought Mr. Pilkington ought to be advised that The Surveyors' Institution did not cover one profession, but that it embraced a group of professions, and included some of the best men in all those professions. That might explain the influence and strength which The Institution possessed when it chose to move. The Institution moved collectively by the Council of course, and Mr. Pilkington's kind presence that evening was an indication of their sympathy. As for the individual

Members and what they could do, one might say at once they would give plenty of sympathy. He would like to see some practical form of help devised, but it was very difficult indeed to suggest a way in which that help could be put forward. All members of their profession were without exception busy men at ordinary times, and now their lives were full to overflowing with work of one kind and another. In taking on something fresh they would require to be kept up to the mark, and Mr. Pilkington must rely upon his own association keeping them up to that mark. He was wondering whether their own provincial committees would be of any use in arousing local interest in questions of this kind.

Mr. Pilkington referred in the Paper to London specially. In London they had no metropolitan committees on the lines of their provincial committees, and he suggested that the Council should organise, for this and perhaps for other purposes, five or six metropolitan committees, which would be able to carry on a work that was too large in detail for the Council to do themselves. This would be a very good opportunity to try the experiment. They would find, when they went into the matter closely, that there were openings in London for many hundreds of disabled men. He did not mean that they should be made into mechanical contrivances in an office, but that they should be trained men. It was no kindness to any man to make him into a draughtsman or a clerk, but once he was trained he would be able to get his own living irrespective of the caprice of any employer or of other circumstances.

He thought that it should be brought home to the reader of the Paper that theirs was not altogether such a simple profession to enter as the general public seemed

to think. The most important thing about any man submitted for admission into the profession was his peculiar temperament, and possession of the right temperament was essential to success.

The only other remark he would like to make was this: they ought not to forget that it was owing to these disabled men, who had sacrificed their all, that their homes were inviolate and they were there that day. That was a debt which could never be repaid. He did not think that any Member of The Institution would want to get away from his responsibility in that respect, but he was always nervous of that old English apathy which was a characteristic of their country, and which had destroyed many of their finest schemes in pre-war days. He desired to warn them about that, and expressed the earnest hope that they would make up their minds to do their part to "make good" for those men who had suffered so much for them.

Mr. WM. WOODWARD (Fellow) explained that his observations would be directed to the architectural and quantity surveying element in The Surveyors' Institution. In that room they would all agree that the work done by the Y.M.C.A. throughout the war deserved the very kindest thanks of every individual in the nation. His two sons were at the front, many Members of The Institution had sons and relatives at the war, and everyone of them spoke with the greatest possible admiration of the comforts which the Y.M.C.A. had provided for all the men. Now, he thought that not only a great obligation but a solemn duty rested upon them all at home to do everything they possibly could to serve the interests of those thousands of their fellow-brethren, the men who had gone to fight for their

country. They must not leave a stone unturned which might possibly forward the interests of those who would come back in health, or not shattered too much to resume their pre-war work and professional duties.

With regard to the conservation of interests, he hoped to be permitted to read a resolution which, with only two dissentients, was agreed to at a recent meeting of the Royal Institute of British Architects, with regard to the danger which appeared to exist from interference on the part of the Government with building operations after the war. Architects and surveyors with considerable patience—a splendid patience, a proper patience—had borne the loss of their professional business and had not complained, because they knew that Government interference with regard to building operations had the object of helping the war in various ways. But after the war things must be and should be very different. Now, there was a feeling that there were backstairs movements going on at the present moment to induce the Government to restrict building operations after the war. The resolution he had referred to went straight to the point, *i.e.*, that matters after the war should be left perfectly free and open and independent so far as building operations were concerned; that there should be no Government department which should be in a position to say you must build so and so, or you shall not build this or that; that you may erect dwellings for the working classes but you shall not build warehouses. That was the object which he and many other persons thought the Government had in view by maintaining the restrictions which existed now with regard to building operations.

It was the intention of the Government, at all events so far as they knew, to make a large monetary grant for

the erection of dwellings for the working classes. All present knew that many thousands of dwellings for the working classes were required, but why should not those dwellings be provided in the same way as in the past? Why should not private enterprise again be brought into play? He feared that large grants by the Government must result in an enormous increase in the cost of the buildings, and also in the houses being let at rents far less than they could be let if a profit had to be made on the transaction. Now that was a state of things which architects—and it was a matter which greatly affected quantity surveyors as well—were determined to prevent as far as possible, and they had therefore passed at a recent meeting of the Royal Institute of British Architects the following resolution:—

“That in view of the important interests involved, this Institute should, in conjunction with other bodies, take steps to represent to the Government the serious objections to the continuance after the declaration of peace of the present war restrictions on building.”

Now, with regard to employment, the main object of the Paper was to secure employment for disabled men after the war, and he agreed with the two speakers who immediately preceded him that there must be individuality. He intended to do all he possibly could to get employment for disabled men, and he intended to do it in a way within the power and opportunity of them all, namely, by suggesting to contractors that they should give work to certain men who had been brought before them for employment. For instance, as an architect he would sooner do his best to secure work for an eligible man coming from Mr. Pilkington's association than anyone else. But as Mr. Pilkington had said, they must distinguish between those who

were physically and mentally eligible for certain positions and those who were not. Many men disabled by the war, who were not professional men, were perfectly able to fill positions such as timekeepers, office messengers, yardmen, clerks of works, and the types of apprentices generally. At all events, it was for each individual to do his best to secure for every man who came back from the war a preference, in whatever capacity he could offer, over those who had not gone to the war. That was the spirit in which he intended to proceed, and he was sure it was the wish with many of his professional brethren to do all they possibly could in the direction of and on the lines suggested by the Paper they had just heard read. He knew of no better source, and of no better ground to work upon, than those set forth by Mr. Pilkington, the vote of thanks to whom he had very much pleasure in supporting.

Mr. E. H. BLAKE (Fellow) had very much pleasure in supporting the vote of thanks because it was a national and personal duty to do everything possible for these disabled men. But he had been wondering what was the magnitude of the task which they were asked to undertake.

Mr. Pilkington had referred to the way in which members of the surveyors' profession had come forward in His Majesty's service. It was of course within the knowledge of many of them that he had had some little part in helping to train surveyors for the last twenty-five years or so. During that time he had had the pleasure of assisting some 9,000 men; of course many of those men were now over age, but of that 9,000 there were to his knowledge some 3,250 who were

serving at the present time, so that clearly surveyors were doing their part. They were also doing their part with regard to gaining distinctions; among those 3,250 were at least 1 V.C., 35 D.S.O., over 200 had obtained the Military Cross, and over 200 had been mentioned in despatches. As the outcome of this, he might say that a hobby of his had been to endeavour to take a close personal interest in, and keep in touch with, the men whom he had assisted in training. Hardly a day passed without some man home on leave coming to see him, and as a result of many chats with them he had found that the idea of emigrating after the war was gradually fading away from their minds. He should say from his experience that almost without exception the men who have been in the surveyors' profession as assistants or surveyors before the war had the intention of coming back to it if they are physically fit. But he had known no men who at the moment of their discharge were in such a state as not to be able to go back to their pre-war work. That had made him wonder what was the magnitude of the task of finding employment for men who could no longer follow their previous occupations. If Mr. Pilkington could give them some idea as to this matter he would be very grateful.

Another point he wished to refer to was with regard to the Pensions Committees. It had been suggested that the committee should invite disabled men to do technical work as surveyors or as Members of that Institution. Unfortunately he had seen letters from two Pensions Committees suggesting the desirability of men going into the surveyors' profession and telling them about the examinations—erroneously, by the way—and of their prospects. He regretted that this should have been done in the two cases he had mentioned,

where an erroneous impression had been given as to the amount of training necessary and as to the prospects when that training had been gone through.

He knew the variety of men that these committees would have to deal with. He appreciated keenly how very diverse are the men of which the Army is at present made up. He had had the experience for a long time, as a motor transport volunteer, of piloting men across London in the small hours of the night, and also, when his health gave up, of work at the Buckingham Palace Hostel. He had therefore come in contact with soldiers of all types, and from his experience he saw how necessary it was to ensure success in new work by making every provision for it.

The question of the Y.M.C.A. interviewers had been referred to, and of course one would agree how necessary it was that great experience should be brought into their work. He had met with cases in which discharged soldiers had been put into surveyors' offices, but the interviewers might with advantage do a little in the way of advising the men as to what contributes to success. Men coming back from the war underwent a certain sort of reaction, and when they returned to civil work he thought they wanted jogging up a little bit on elementary matters. It had been said that "No man can end by being superior who will not begin by being inferior"; and again, "It is in vain to put wealth within the reach of him who will not stretch out his hand to take it." One of the surest ways of commanding success was to deserve it, and a man setting out on a new walk in life was well armed if he fully appreciated such apparently elementary things as the importance of punctuality in his engagements, the economy of time, how time is wasted by lack of

method, the value of courtesy and tact, the necessity of cultivating business habits, the value of self-help, and the danger of over-help from others. He thought, therefore, there was justification for everyone who interviewed a man in regard to taking up new work to give a gentle reminder on those points.

Mr. Pilkington had referred to the question of neurasthenia. He (the speaker) had had some experience of men so suffering, and he was strongly of the opinion that they ought not to be trained for indoor work. It was a serious nerve complaint, and with it men could not concentrate their minds. As a rule it unfitted them for indoor work; outdoor work was their best chance.

The PRESIDENT, in putting the motion, said that he was sure the Paper would be very useful, and that it would be read with interest by Members all over the country to whom it would be sent. A suggestion had been made in the course of the discussion that a small committee should be appointed to consider the subject. That suggestion would be brought before the Council at their next meeting.

The motion was then put and carried unanimously.

Mr. PILKINGTON, in acknowledging the vote of thanks, said he would have liked to have had the opportunity of making one or two remarks on some of the points which had been raised in the course of the discussion. But the time was getting on, and he knew that the Members of The Institution were all very busy men. He therefore would not detain them as he understood from the President that he would have an

opportunity of putting his detailed reply in writing and that would be published with the Paper. He was very grateful for the kind way in which they had listened to his remarks and for the part they were willing to take in the matter in the future.

Time not permitting Mr. PILKINGTON to deal verbally with all the points raised in the discussion, he has forwarded the following reply:—

I am very grateful for the kind reception which has been given to the Paper I have had the pleasure of reading before you this evening, and have been much struck with the practical way in which all the speakers have faced the problem before us. I was particularly interested in the remarks made concerning afforestation, first because there are a great number of men who will be compelled to take up outdoor work in the country owing to their lungs having been affected either by tuberculosis or gas. They will, perhaps, be able to be trained in market gardening and fruit farming, but neither of these will, I believe, give them as much work as they can tackle during the winter months. If, therefore, it is possible to combine work of this kind with afforestation, it should prove an excellent means of these men being able to add to their income. They are men of all sorts and descriptions with all kinds of previous industrial experience, education, &c.

I am afraid the statement I should like to be able to publish as giving the real results of the work done by our Exchanges would be too complicated to be included in your *Transactions*. We have seen something like 16,000 men, and have been instrumental in placing

something over 8,000. As most of these men have been really disabled, I do not think our record is so bad on the whole. I hope that it will be found that men are going to be more rapidly discharged from the Army than has previously been the case. It is very difficult to get men with anything like a real knowledge of mechanics to go into the country unless there is some such reason as lung trouble to force them to do so, because at present they can earn so much better money in munition works. The idea of printing a list of men wanting particular jobs has been put before me from other quarters, and I hope soon that some scheme may be evolved whereby this idea can be carried out.

If the surveyors' profession is really in need of men at the present moment, I sincerely hope that everybody knowing of any vacancies will see that they are notified to the nearest Employment Exchange, so that they can be put at the disposal of the committees which are rapidly being brought into existence to deal specially with placing disabled men. There is no reason at all why the green form as it stands should not be printed, except, I imagine, the cost; but any of the items could be taken from it that the Council think fit.

As far as regards the help that individual Members can give, I think the opportunities offered are—

- (1) As interviewers, in connection with the Joint Sub-Committee which will, we hope, be attached to every Employment Exchange before long.
- (2) As canvassers, either amongst the employers with whom they automatically come in contact, or amongst every kind of employer included in certain districts.

- (3) As clerical workers, because there is always a great mass of this to be done if everything is to be carried out efficiently. Much help can be given by any man who will take a really intelligent interest in the statistics, so that all the information can be extracted from them.
- (4) In the preparation of schemes of training. Training can either be done through a college, institute, &c., or by firms. It might be possible, for instance, to get a group of farmers close to a small country town to take so many men each and train them in particular branches of farming. A hostel might be provided where these men could stay. This is a branch of the work the Y.M.C.A. will be quite prepared to undertake, so that their social life could be provided for more on the lines to which they were accustomed if they came from towns. Any scheme of this kind would have to be sanctioned by the Joint Pensions Committee of the training area in which it is situated.

I certainly hope that something more will come of the suggestion that five or six London committees should be appointed to deal with the problem. It would be a great help if something could be put into writing as to the temperament required for men likely to be successful in the surveyors' profession.

The number of men discharged from the Army up to the end of September has been given officially as 325,000. I think it can be assumed that half of these have either gone back or will go back to their old employers. About one-sixth will be so little disabled

by their time in the Army as to be just as capable of earning their living as they were before. This leaves one-third, or something over 100,000 men, who will need something in the form of special assistance in obtaining employment suitable to their disabilities.

I quite agreed with the fading away from men's minds of the idea of emigration. You see the same thing in another form. On first returning home many men feel moved to take up work in the country. Three or six months' life in a town very soon brings back all the old attractions, and does away with any such idea. It certainly must be borne in mind that our present Army is composed of all sorts of men from every point of view, and that every sort of man has every kind of disability. This makes the problem different from anything we have ever had to face before.

I was much interested in the idea of interviewers suggesting to the men the acquiring of business habits, &c. They certainly might do something, but I am far keener in trying to get the employers to realise what difficulties these men have had to face, and how little it is their own fault if they have lost business habits and the work habit they had before the war. It is not really fair to expect these men to take up full work the moment they return. If they are treated firmly but kindly for a period of three or four months, I think employers will soon find a marked difference.

I can only repeat how grateful I am to you, Sir, and to your Members, for the kind way in which you have received the Paper, and also for the vote of thanks you have so kindly given me.

THE TAXATION, RATING, AND VALUATION OF MINES.

BY DAVID BOWEN (FELLOW), F.G.S., M.I.M.E., &C.,
CAPTAIN, R.E.

*Read at the Ordinary General Meeting of THE SURVEYORS'
INSTITUTION, held on Monday, 25th February, 1918.*

ARTHUR LYON RYDE (President) in the Chair.

It is necessary, at the outset, that the author should ask the indulgence of the Members of The Institution in regard to this Paper. The subject is one which has engaged the author's attention for several years, but as this discussion is chiefly concerned with the legal and economic aspects of the taxation and rating of mines in this country—particularly the development of both imperial and local taxation within recent years—it is obvious that a whole host of difficulties present themselves in face of any clear conclusions at the present juncture.

In the first place, it is almost impossible to appreciate accurately the effects of a system of taxation, such as that introduced by the Finance (1909-10) Act, 1910, without analysing statistical and other records over a

number of years both previous and subsequent to the imposition of the particular tax or taxes concerned. In the present case the author's difficulty has been enormously increased by two facts—the one responsible for the other—the present European war and the author's military service both at the front and at home since early in August, 1914. These two facts have rendered the work of reference exceedingly difficult, and the present Paper was only rendered possible by an arrangement, very kindly granted to the author, of postponing the discussion of some vital considerations to a later date, the present Paper serving as a general introduction to the whole subject.

It is hoped that this arrangement will serve to render the second Paper more complete, as Members by their remarks upon the subject-matter contained in this preliminary Paper may suggest important points affecting the general question which could then be fully discussed in the later Paper. In this way it might perhaps be possible to arrive at more definite conclusions as to the points on which reforms are needed. It is probable that for some years the State may have to resort to heavy and varied forms of taxation in consequence of the present war, and The Institution may, perhaps, be of some assistance in determining what form of taxation and what amount may fairly be applied to mines, as distinguished from other industrial concerns, without prejudice to their proper development. Very heavy sums have been sunk by way of capital expenditure; labour troubles are constantly arising; engineering difficulties, particularly in connection with concealed coalfields, are becoming increasingly greater; and the ingenuity and resourcefulness of those directing mining concerns are being taxed to the uttermost.

For the sake of completeness the author has included in this Paper a general outline of existing conditions, with a brief historical account, showing in bare outline the development of both theoretical principles and the practical aspect of taxation. This was considered necessary also in the interests of the younger Members of The Institution.

The importance of mining undertakings and mineral properties as sources of revenue, both for imperial and local purposes, cannot be overestimated. A study of Table I.—which shows the production of minerals and their estimated values for the years 1899-1913—will serve to prove this.

The total output of coal in 1913—as will be seen from this table—amounted to about 287,430,473 tons, of the estimated value of £145,535,669.

From Table II. we see that the total population of the United Kingdom in 1911 was estimated at 45,298,573, of whom 1,214,165 were engaged in and about, and working and dealing in the products of mines and quarries. Of these the bulk are engaged in and about coal mines.

From Table III. we see that the total revenue from income tax in the year 1913-14 amounted to £47,240,771. The gross amount of income from mines assessed for this tax, in the same year, amounted to £19,611,489.

From the same table we see that whilst the total population of the United Kingdom has increased during the period 1901-14 by about 12 per cent., the revenue derived from income tax has increased by 34 per cent., and the gross amount of income from mines assessed for income tax has increased by about 11 per cent.

Table IV. gives the amount derived from the recent mineral rights duty for the years 1910-11 to 1915-16.

PRINCIPLES OF TAXATION AND TAXING SYSTEMS.

Bastable¹ defines a tax as a "compulsory contribution of the wealth of a person or body of persons for the service of the public powers."

In order to fulfil its functions the State must be possessed of revenue, and although in early times the various forms of taxation were adopted on almost entirely practical grounds, since the close of the eighteenth century economists have sought to define the general principles which should govern taxation, and nowadays every proposal with a view to reforms in taxation is subjected to detailed criticisms not only from practical but also from theoretical grounds.

As these general principles—widely accepted by both economic theorists and practical experts—form the basis of modern systems of taxation, it is considered that a brief summary of them may be given here.

Adam Smith² expressed the general principles which in his opinion should govern taxation in the form of maxims, as follows:—

"(1) The subjects of every State ought to contribute towards the support of the Government, as nearly as possible in proportion to their respective abilities; that is, in proportion to the revenue which they respectively enjoy under the protection of the State.

"(2) The tax, which each individual is bound to pay, ought to be certain, and not arbitrary. The form of payment, the manner of payment, the quantity to be paid, ought all to be clear and plain to the contributor and to every other person.

¹ *Public Finance* (1895), p. 249.

² *Wealth of Nations*, Book V., chap. 2, part ii.

“(3) Every tax ought to be levied at the time, or in the manner in which it is most likely to be convenient for the contributor to pay it.

“(4) Every tax ought to be so contrived as both to take out and keep out of the pockets of the people as little as possible over and above what it brings into the public treasury of the State.”

In these four maxims there are embodied the principles of *equality, certainty, convenience, and economy*. Although these were for a time adopted by most economic writers, they have of late years been subjected to a good deal of adverse criticism. Bastable,¹ for instance, suggests that taxation should be: (a) *productive*; (b) *economical*—inexpensive of collection, and should retard as little as possible the development of wealth; (c) *justly apportioned*; and (d) *elastic*. That it should be (e) *certain*, and (f) *convenient*, he regarded as matters of less interest. Should any one canon conflict with another, the solution should be sought in the surrender of the less important one. Thus the successful administration of the State being the final object, convenience, or even equity, may have to yield to productiveness.²

This introduces the rule of *expediency*, which, as Plehn observes,³ “Works in the most astonishing ways “ to prevent the execution of approved principles.” In the case of *Coltness Iron Company v. Black* (1881), Lord Blackburn stated his opinion as follows: “No tax can “ be imposed on the subject without words in an Act “ of Parliament clearly showing an intention to lay a “ burden on him. But when that intention is sufficiently “ shown, it is, I think, vain to speculate on what would “ be the fairest and most equitable mode of levying that

¹ *Public Finance*, p. 388.

² Palgrave, *Dictionary of Political Economy* (1908). Vol. III., p. 518.

³ *Introduction to Public Finance* (1900), p. 73.

“ tax. The object of those framing a Taxing Act is to
“ grant to Her Majesty a revenue ; no doubt they would
“ prefer, if it were possible, to raise that revenue equally
“ from all, and, as that cannot be done, to raise it from
“ those on whom the tax falls with as little trouble and
“ annoyance and as equally as can be contrived ; and
“ when any enactments for the purpose can bear two
“ interpretations, it is reasonable to put that construction
“ on them which will produce these effects. But the
“ object is to grant a revenue at all events, even though
“ a possible nearer approximation to equality may be
“ sacrificed in order more easily and certainly to raise
“ that revenue, and I think the only safe rule is to look
“ at the words of the enactments and see what is the
“ intention expressed by these words.”¹

The famous doctrine of the seventeenth and eighteenth centuries that taxes are a *quid pro quo*—payments to the State for benefits received—is no longer accepted. As Bastable states: “The equivalence between
“ the amount of taxes paid and the benefits obtained is
“ rather to be found in the case of the community as a
“ whole than of any special part of it.”² Further, Adam Smith’s first maxim, that subjects ought to pay according to their respective abilities, is not now taken as meaning strictly in proportion to revenue, but that equality of taxation means equality of *sacrifice*. People should be taxed, not in proportion to what they have, but to what they can afford to spend.³

This last doctrine is peculiarly interesting as forming the basis during recent times of attempts to obtain revenue by progressive income taxes and death duties.

¹ Dowell, *Income Tax Laws*, 7th ed. (1913), p. 19.

² *Public Finance*, p. 253.

³ J. S. Mill, *Political Economy*, Book V., chap. II., §§ 2 and 4.

TAX SYSTEMS.

The bulk of the taxation revenue of a modern state is raised by a judicious mixture of *direct* taxes on income and property, and *indirect* taxes on commodities. Such a combination whilst it minimises the effects resulting from the unpopularity of direct taxes, and the disturbances caused to industry by indirect, has an additional advantage in its elasticity which makes it possible to adjust receipts to expenditure without undue inconvenience to the taxpayers.¹ "The steady growth of the
" receipts from commodities in time of prosperity,
" the definite yield of direct taxes, and the power of
" altering the rate of the income tax, taken together,
" provide the conditions for securing such growth or contraction of receipts as may be thought most desirable.²
" A point in favour of an income tax is that the rate
" may be easily adjusted to the exigencies of the
" moment."

A classification of taxes into *real* and *personal* has been suggested, taxes on land, houses and goods being regarded as *real*, and capitation and income taxes as *personal*. All taxes are, however, in the last resort paid by *persons*. This consideration introduces the question of the *incidence* of taxation, one of the most baffling problems in economic science, and to which we will revert later when discussing its practical bearings on the main question at issue.

The difficulty of arranging a satisfactory classification of taxes has led many economists to be satisfied with arranging taxes under their separate distinguishing heads: Taxes on (1) land, (2) houses, (3) property and

¹ Palgrave, p. 519.

² Bastable, p. 336.

capital, (4) income, (5) customs, (6) excise, (7) communications, (8) stamps, (9) death duties.¹ It should be noted that capital is here included as a source of revenue. This has peculiar significance in its relation to mining concerns, and it will be necessary to revert to it later. Suffice it to say, for the moment, that it is generally accepted that "to provide that taxation shall fall entirely "on income, and not at all on capital, is beyond the "power of any system of fiscal arrangements."² "Any "tax is certain to take some wealth that would other- "wise have been diverted to the aid of production."³

It will now be convenient to discuss in detail the methods by which taxation is actually levied in this country. For this purpose it is necessary to distinguish between *Imperial Taxation* and *Local Taxation*. By imperial taxation is meant taxation levied by the State for the benefit of the nation as a whole, by way of income tax, taxes on land, houses, customs, excise, &c., and administered by the Government, whilst local taxation is raised and administered through the medium of local authorities.

The two kinds of taxes are commonly distinguished by the terms *Taxes* or *Duties* and *Rates* respectively.

*Taxation of Income.*⁴

The Income Tax Act, 1779—introduced by Mr. Pitt—instituted a general tax on property and employments calculated with reference to the income for the year. Income was classified as follows:—

¹ Palgrave, p. 520.

² J. S. Mill, *Principles*, Book V., chap. II., § 7.

³ Bastable, p. 275.

⁴ For this section the author is indebted largely to Dowell's *Income Tax Laws*, and Palgrave's *Dictionary of Political Economy*.

- (1) Income from land—including houses—comprising incomes of owners, tenants, and mesne lessors under demises in consideration of fines ;
- (2) Income from personal property, and from trades, professions, offices, pensions, stipends, employments and vocations ;
- (3) Income arising out of Great Britain ;
- (4) Income from any other source.

Various deductions and abatements were allowed.

The Income Tax Act of 1803 differed from the previous Act, particularly in that no general return of income from all sources was required, but particular returns of income from particular sources were then substituted. Various alterations were made to this Act in 1805 and 1806. The unpopularity of the tax, however, led to its repeal in 1806, but it was revived in 1842 for purposes of fiscal reform, and now may be assumed to have taken a permanent place in the English system of taxation. The tax was continued from time to time, and was extended to Ireland in 1853.

Subsequently to this many alterations in detail have been made. The most important are to be found in the Finance Acts of 1894, 1897, 1898, and 1907, and the Finance Acts of 1910, 1914, and 1915.

By the Finance Act, 1907, relief is granted in respect of "earned income" where the total income from all sources does not exceed £2,000. The relief is extended by the Finance (1909-10) Act, 1910, to incomes not exceeding £3,000. The Finance Act, 1907, also contains important provisions respecting returns by employers, extension of time for making assessments, and recovery of penalties, &c.

By the Finance (1909-10) Act, 1910, a *super tax*, or additional duty of income tax, is imposed on the total incomes from all sources of individuals, exceeding £5,000, at the rate of 6*d.* for every £ of the amount by which the total income exceeds £3,000. Also new duties were imposed on land, as follows:—

- (1) *Increment Value Duty*.—This is a duty of 20 per cent. on the increment value of land, payable when land is sold or leased for not less than fourteen years, and when it passes by death, and is to be charged on the increase in site value of the land as from the 30th April, 1909, but the duty is payable only once in respect of the same increment. Full allowance is to be made for all improvements effected on the land, and the duty is not to be charged upon the first 10 per cent. of increment value. Provision is made for the periodical payment of the duty on land held by bodies corporate.
- (2) *Reversion Duty*.—A duty of 10 per cent. on the value of the benefit accruing to the lessor on the determination of a lease of land. Leases of agricultural land and leases for not more than twenty-one years are exempted.
- (3) *Undeveloped Land Duty*.—A duty of $\frac{1}{2}$ *d.* in the £ on the site value of undeveloped land exclusive of any value due to minerals under the surface.
- (4) *Mineral Rights Duty*.—A duty of 5 per cent. per annum on the rental value of all rights to work minerals and all mineral wayleaves. Brick-clay, sand, chalk, limestone, and gravel

are not minerals for the purposes of this duty, and full allowance is made for all capital expenditure.

By the Finance Act, 1914, super tax was levied on incomes from all sources exceeding £3,000 as follows:—

In respect of the excess over £2,500 for every pound—

£	s.	d.
Of the first 500 of the excess	0	5
do. next 1,000 do.	0	7
do. do. 1,000 do.	0	9
do. do. 1,000 do.	0	11
do. do. 1,000 do.	1	1
do. do. 1,000 do.	1	3
do. remainder	1	4

By the Finance Act, 1915, super tax was levied at double the above rates, and this scale was further extended by the Finance (No. 2) Act, 1915, as follows:—

In respect of the excess over £2,500 for every pound—

£	s.	d.
Of the first 500 of the excess	0	10
do. next 1,000 do.	1	2
do. do. 1,000 do.	1	6
do. do. 1,000 do.	1	10
do. do. 1,000 do.	2	2
do. do. 1,000 do.	2	6
do. do. 1,000 do.	2	10
do. do. 1,000 do.	3	2
do. remainder	3	6

A new duty—the excess profits duty—was also imposed by this Act, as follows:—

“There shall be charged, levied and paid on the amount by which the profits arising from any trade or business in any accounting period which ended after the 4th day of August, 1914, and before the 1st day of July, 1915, exceeded, by more than £200, the pre-war standard of profits a duty of an amount equal to 50 per cent. of that excess. For the next period ending on or before December 31st, 1916, this duty is 60 per cent. of the excess over £200, and 80 per cent. for the period subsequent to December 31st, 1916.”

The income tax is now imposed annually by the Finance Act for each year. Each Finance Act incorporates (*mutatis mutandis*), and subject to any amendments, the provisions of the previous Acts, which would include those of the principal Income Tax Acts of 1842 and 1853.

The comprehensive system of direct taxation under the Income Tax Act has for its object the taxation of income from every source in the United Kingdom, and the income of residents in, from sources out of, the kingdom.

Existing Income Tax.

The tax is divided into five branches, having reference to the different sources of income, and termed Schedules (A), (B), (C), (D), and (E).

Schedules (A) and (B), in combination form the charge upon landed property. Income from this source is taxed where it arises, including that of landowners, tenants, owners of income issuing out of or charged on the land, and mortgagees. Subsequently the burden is distributed so as to fall on the persons who are in enjoyment of the income.

Schedule (A) contains the tax on the owners of land and houses in respect of the property in them. The rent or annual value is the basis of the charge.

Schedule (B) contains the tax in respect of the *occupation* of land. Rent or annual value forms the basis of the assessment under the Schedule, the duty now being charged on the annual value.

The assessment and collection under these schedules is in the regulation of the general commissioners—a short term for the commissioners for the general purposes of the Acts—who are chosen from the Land Tax Commissioners. The commissioners appoint the assessors. The assessors give the necessary notices to the occupiers of lands and houses. The occupiers make returns of rent or value. The returns are inspected by the assessors, and eventually are settled by the commissioners, and due notice having been given and time for appeal allowed, the commissioners sign the assessments in duplicate, and deliver one of these to the local collector, together with a warrant for collecting and recovering the duties.

Although the assessments under these schedules are made annually, the valuations are allowed to stand as a rule for five years. In a year when no new valuation is required provision is made in the Finance Act for that year, that the annual value for the previous years shall be taken as the annual value for that year. The surveyors then act as assessors in lieu of the ordinary local assessors.

Schedule (C) includes income from any public revenue, imperial, colonial, or foreign.

Schedule (D) relates to income from professions, trades, and other occupations, and income not included in the other schedules. It is divided into six cases,

having reference to income from the following sources :
Case i.—Trades, manufacturers, and adventures ;
Case ii.—Professions, employments, or vocations not contained in any other schedule ; *Case iii.*—Profits of an uncertain annual value not charged in Schedule (A) ;
Cases iv. and v.—Income from securities and possessions abroad ; *Case vi.*—Annual profits or gains not charged under any other schedule.

Profits under Cases i., ii. and v. are charged upon an average of three years ; profits under the other cases, as a rule, on the amount received in one year. The assessment, based upon a return of income from the taxpayer, under this schedule is in the hands of additional commissioners chosen for the purpose by the general commissioners.

The taxpayer may, however, on due notice being given, require the assessment of his profit to be made by *special* commissioners—a short term for commissioners for special purposes—in lieu of the additional commissioners. These special commissioners, besides making assessments on other cases, assess the super tax, and have power to hear appeals against assessments of mines, quarries, &c.

Schedule (E) relates to persons in the employment of the State, or in other public employments of profit.

For the purposes of this Paper we are concerned only with Schedules (A) (No. III.) and (D) of the Income Tax Act, 1842, as incorporated in subsequent Acts.

Under Schedule (A) (No. III.) of the Income Tax Act, 1842, income tax is chargeable on mines and minerals as follows :—

“ The annual value of all the properties hereinafter described shall be understood to be the full amount for one year, or the average amount for one year, of the

profits received therefrom within the respective times herein limited :—

“First.—Of quarries of stone, slate, limestone, or chalk, on the amount of profits in the preceding year.

“Second.—Of mines of coal, tin, lead, copper, mundie, iron, and other mines,¹ on an average of the five preceding years, subject to the provisions concerning mines contained in this Act.

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and the said charge shall be made on the said profits exclusively of any lands used or occupied in or about the concern.”

Under the Income Tax Act, 1860, persons assessed in respect of any quarry of stone or slate, or mines, may appeal against the assessment to the Commissioners for Special Purposes instead of the Commissioners for General Purposes.

This leads to the consideration of the distinction in English law between a “quarry” and a “mine.” A “quarry” is held to be “a thing which is worked by “taking away the surface and not by sinking a shaft,”² in other words, an *open working*. A “mine” is “an *underground working*.”³

In contradistinction to this rule of English law, a slate quarry is held to be assessable under Rule 1 as a quarry, and not under Rule 2 as a mine, although the slate be obtained by underground working. The statute imposes

¹ Alum mines are expressly provided for in Rule 3 on the profits of the year preceding.

² Esher, M.R., in *Jersey v. Neath Union* (1889), 22 Q. B. D., 555, 558.

³ *Bell v. Wilson* (1866), L. R., 1 Ch., 303 ; 35 L. J., Ch., 337. Turner, L.J.

the tax upon what is worked, and not on the mode of working.¹

It is important to note here the legal decisions given with reference to various appeals against assessments under the foregoing rules.

The Revenue Act, 1866, enacts:—

“Section 8. The several and respective concerns described in No. III. of Schedule (A) of the Income Tax Act, 1842, shall be charged and assessed to the duties hereby granted in the manner in the said No. III. mentioned, according to the rules prescribed by Schedule (D) of the said Act, so far as such rules are consistent with the said No. III.: Provided that the annual value of profit and gains arising from any railway shall be charged and assessed by the Commissioners for Special Purposes.”

The section above quoted was held in the cases of *Knowles v. McAdam* (1877) and *Miller v. Fairlie* (1878) to have the effect of transferring the concerns described in No. III. of Schedule (A) to Schedule (D), so as to change the respective times of average on which the profits were to be assessed from five years under Schedule (A) No. III. to three years under Schedule (D).

But in the case of *Coltness Iron Company v. Black* (1881) the House of Lords over-ruled this decision. Lord Blackburn gave his opinion as follows: “In ‘*Knowles v. McAdam* Chief Baron Kelly says: ‘It is “ ‘quite clear that Section 8 of 29 Vict., c. 36 (Revenue “ ‘Act, 1866), transfers the present case (that of a coal “ ‘mine) from Schedule (A) to Schedule (D),’ and the “judgments of the Baron in that case seem to me to “depend a good deal on this, as it seems to me, erroneous “assumption. I think that the duties are to be assessed

¹ *Jones v. Cwmorthen Slate Company* (1879).

“ according to the rules in Schedule (D), and conse-
“ quently all the anxiously devised provisions for keep-
“ ing the returns under Schedule (D) secret and con-
“ fidential, to be found from Section 100 to Section 131,
“ are made in future to apply to returns for the concerns
“ described in No. III. in Schedule (A), and any rule
“ expressed as to the mode of computing the annual
“ profits or properties chargeable under No. III.
“ If the effect of Section 8 of 29 Vict., c. 36 (Revenue
“ Act, 1866), was to transfer cases in Schedule (A) to
“ Schedule (D), it would change the respective times on
“ an average for which the profits were to be assessed.
“ Mines would be reduced from a five-year period to a
“ three-year period. Quarries and things of that sort
“ would be raised from a single year to three. I cannot
“ think this was either intended or expressed. But on
“ the assumption that it had this effect, the Exchequer
“ Division came, in *Knowles v. McAdam*, to a very
“ startling decision.”

The following extract is taken from the Twenty-fourth Report of the Commissioners of Inland Revenue for the year ending March 31st, 1881 (p. 78), with regard to the above decision:—

“ The question in dispute was as to the effect of Section 8 of the Act 28 and 29 Vict., c. 36, which directs that mines and such-like concerns ‘ shall be charged and ‘ assessed ’ to the income tax in the manner in the said No. III. (of Schedule (A), 5 & 6 Vict., c. 35, &c., 60—Income Tax Act, 1842) mentioned according to the rules prescribed by Schedule (D) of the said Act, so far as such rules are consistent with the said Schedule (A).

“ Now that the point in dispute has been finally and authoritatively settled by the House of Lords, we may state as a fact that the section referred to was intro-

duced at the instance of the mineowners, solely to enable them, if they so desired, to return their profits for assessment in one sum by the special commissioners of income tax instead of returning them for assessment by the local commissioners of income tax, and that there was no intention whatever by the section referred to to alter the incidence of the tax or the average on which returns were required by the previously existing law to be made by mineowners.

"The judgment of the House of Lords now conclusively decides that the section referred to enacts what it was intended it should enact, and no more."

The Master of the Rolls, Cozens-Hardy (1912), gave his opinion as follows in *Wakefield Rural District Council v. Hall*:—

"Section 8 of the Act of 1866 does not transfer the concerns from Schedule (A) to Schedule (D). It only simplifies the somewhat concise rules contained in No. III. of Schedule (A) by making the far more elaborate rules prescribed by Schedule (D) applicable so far as such rules are consistent with No. III. It in no way incorporates Section 101, which is not, and cannot be called, a rule prescribed by Schedule (D). The Act 1866, in short, gave fuller directions for ascertaining profits where Schedule (A) was silent, but it had no further or other effect."

The practical aspect of this question has been ably dealt with by Mr. A. Hassam.¹ He quotes as an example a colliery having earned profits for five years, as follows: 1899, £15,000; 1900, £40,000; 1901, £20,000; 1902, £10,000; 1903, £1,000. The average profit for the five years is £17,200. By being allowed to take the last three years' average, the profit for assessment would

¹ *The Taxation of Collieries*.—Trans., Inst. Mining Engineers, 1905.

amount to £10,333, a sum less by £6,867 than the average over five years.

Schedule (A) No. IV. contains fourteen rules and regulations as to the charge under Schedule (A). The fifth rule is of especial importance in regard to mines and is stated as follows:—

“If any mine enumerated in the fifth rule,¹ No. III. of the Schedule, has, from some unavoidable cause, been decreased and is decreasing in the annual value thereof, so that the average of five years will not give a fair and just estimate of the annual value thereof, it shall be lawful, after due proof before the commissioners for general purposes in the district where such mine shall be situate, to compute such annual value on the actual amount of such profit and gains in the preceding year ending as aforesaid, subject to such abatement on account of diminution of duty within the current year as is herein provided in other cases; and if any such mine shall, from some unavoidable cause, have wholly failed, it shall be lawful for the said commissioners, on due proof thereof, wholly to discharge any assessment made thereon.

“Such mine shall be assessed in the parish or district where situate.”

It is important to note decisions with reference to deductions and allowances. In the case of *Miller v. Fairie* (1878) it was held that no deduction was allowable in respect of capital lost through partial exhaustion of the mines. In the case *Knowles v. McAdam* (1877), before the House of Lords, it was held that a mine-owner is not entitled to deduct a sum as representing the amount of capital expended in making bores and

¹ There is no fifth rule—it should be the second rule. It was the fifth rule in No. II. of the Income Tax Act, 1805, and the fifth rule in No. III. of the Income Tax Act, 1806.

sinking pits, which had been exhausted by the year's working.

In the case of *Coltness Iron Company v. Black* (1881) Lord Cairns said :—

“I am not prepared to say that under the words of 5 and 6 Vict., c. 35 (Income Tax Act, 1842), a mineowner might not in some cases be entitled to an allowance in respect of the cost of sinking a pit, by means of which pit the minerals are gotten which are the source of profit for the year in which the pit was sunk. I desire to reserve my opinion on that point until the question arises. But in the present case the question is altogether different. It is, as now explained, can a mineowner write off and deduct from the gross earnings of his mine in a particular year a sum to represent that year's depreciation of all the pits in the mines whenever sunk? I am clearly of opinion that this cannot be done.”

Lord Penzance said :—

“The words ‘profit received therefrom’ are here introduced to define the annual value of the thing which is to be taxed, which is the ‘mine,’ and it could not, I think, be intended that for the purpose of calculating the ‘annual value’ of a ‘mine’ the original cost of the ‘mine’ itself, or any part of it, should be first deducted. On the contrary, the words ‘profit received therefrom’ in this connection mean, I think, the entire profit derived from the mine, deducting the cost of working it, but not deducting the cost of making it.”

Lord Blackburn, in the same case, said :—

“It was said by Lord Cairns in *Gowan v. Christie* that ‘a lease of mines is not in reality a lease at all in ‘the sense in which we speak of an agricultural lease. ‘What we call a mineral lease is really, when properly ‘considered, a sale out and out of a portion of the land.’ I think this is a perfectly accurate statement. But the argument that no income tax should be imposed on what

is, perhaps not quite accurately, called rent reserved as a mineral lease, because it is a payment by instalments of the price of minerals forming part of the land, any more than on the price paid down in one sum for the out-and-out purchase of the minerals forming part of the land, is, I think, untenable. . . . I do not wish to lay down any general proposition, either that money expended in sinking pits can never be in the nature of expenses incurred within the five years in working the coal so as to be properly taken into account in estimating the profit made in that period; or to say what, if any, the circumstances are under which it may be done. That, I think, had better be left to be determined when the case arises."

In the case of *Addie v. Solicitor of Inland Revenue* (1875) it was held that coal and ironmasters are not entitled to deduct a percentage for pit sinking and for depreciation of buildings and machinery. But subsequently the Customs and Inland Revenue Act (1879) enacted:—

"Section 12. Notwithstanding any provision to the contrary contained in any Act relating to income tax, the commissioners for general or special purposes shall in assessing the profits or gains of any trade, manufacture, adventure, or concern in the nature of trade, chargeable by reference to the rules of that Schedule, allow such deduction as they may think just and reasonable as representing the diminished value by reason of wear and tear during the year of any machinery or plant used for the purposes of the concern . . . where machinery or plant is let to the person or company by whom the concern is carried on upon such terms that the person or company is bound to maintain the machinery or plant, and deliver over the same in good condition at the end of the term of lease. No claim for such deduction will be allowed unless it be made within twelve calendar months after the expiration of the year of assessment."

The case of *Bonner v. Bassett Mines, Limited* (1912), is of special interest. This company sank a shaft of a tin mine about 50 fathoms further down, which extension, together with the old portion, was used as a ventilating shaft and as a centre from which levels and roads could be cut for the purpose of discovering lodes or pockets of ore at a level below those portions of the mine which had been wholly or partially exhausted, and also for the purpose of raising and lowering men and materials, but not for the purpose of winning ore from a vertical lode. The sinking operations occupied about two years and cost £2,940. The commissioners allowed the deduction of the said sum, being of opinion that the expenditure was proper working cost, and could not properly be dealt with as capital.

It was held that there was no evidence to support the finding of fact by the commissioners, and further, that the expenditure was capital expenditure and not working expenditure, and that the company were in effect opening up a new mine, and accordingly the deduction was not permissible.

In the case of *Morant v. Wheal Grenville Mining Company* (1894) it was held that it is a question of fact in each case whether expenditure in sinking a shaft is capital expenditure not to be deducted or working expenditure to be deducted, as where the minerals lie at shallow depths and the shafts are short in length.

The net result of all these decisions is that no deduction may be allowed on account of *capital* expenditure.

RATING OF MINES.¹

The rating system of England and Wales is a very

¹ For this section the author is largely indebted to Cockburn's *Law of Coal*, and Castle's *Law and Practice of Rating*, 4th ed. (1903).

simple form of taxation in so far as rates are levied in respect of immovable property. There are, however, considerable complications in the system which arise chiefly from two causes: (1) The various areas for which rates are levied; (2) the different charges upon various classes of property according to their nature.

Under the Poor Relief Act, 1601, passed in 1603, poor rates were levied by overseers on every parochial inhabitant and occupier of land, houses, tithes, coal mines, and saleable underwoods, according to the ability of the parish.

The express mention of coal mines as liable to assessment was held by the courts to exclude other kinds of mines, and these were not made rateable until the Rating Act of 1874.¹ The result of the passing of this Act rendered obsolete a large class of cases, which decided that though mines were not rateable, quarries, &c., worked without the intervention of a shaft, galleries, &c., were rateable.

In 1836 the Parochial Assessments Act defined the standard by which the value of property for rating purposes should be determined as "an estimate of the
" net annual value of the several hereditaments rated
" thereunto—that is to say, of the rent at which the
" same might reasonably be expected to let from year
" to year, free of all usual tenant's rates and taxes, and
" tithe commutation rent-charges, if any, and deducting
" therefrom the probable average annual cost of the
" repairs, insurance, and other expenses, if any, necessary
" to maintain them in a state to command such rent."

To constitute liability to be rated there must be occupation in the sense of actual possession. The occu-

¹ *Rex v. Sedgely* (1831); *Rex v. Dunsford* (1838); *Rex v. Brettell* (1832).

piers of a mine are rateable when the mine is being worked, even if the royalties payable to the owner absorb all the profit and no surplus profit for the occupier left. The occupation need not necessarily be commercially profitable, it is enough if it be beneficial.¹ It is rateable whenever it is of value. On the other hand there is no liability to be rated whilst sinking pits;² liability is incurred when the mine is being worked and is productive.³ If a mine is exhausted and is no longer being worked, even though minimum rent is being paid to the lessor, the mineowner is not liable to be rated.⁴

If a mine is at a standstill and it is not known when working will recommence, the mine becomes rateable as a warehouse for the machinery and plant which is being kept in order.

Apart from the mine itself, and the rights incidental to occupation, the occupier is liable to be rated for surface land and works, including machinery and plant; even though the occupier himself may have erected the buildings, machinery, or plant, he is liable to be assessed on the improved value, the theory being that he will be remunerated by the greater quantity of coal which can thereby be raised. The following are the circumstances in which machinery and similar property are rateable:—

1. Things are liable to be rated which, though capable of being removed, are yet so far attached that it is intended that they should remain permanently connected with the undertaking, or with the premises used with it, as essential to its working.⁵ Regard is to

¹ *Rex v. Parrott*. (See Appendix I.)

² *Staley v. Castleton*. (See Appendix II.)

³ *Tyne Coal Company v. Wallsend* (1877). (See Appendix III.)

⁴ *Rex v. Bedworth* (1807). (See Appendix IV.)

⁵ *Tyne Boiler Works v. Longbenton*.

be had to the degree of annexation and the object of annexation, *i.e.*, whether permanent or temporary, and only for the enjoyment of the chattel itself. If things are annexed, though but slightly, with a view to the enhancement of the inheritance and the permanent improvement of it, they may be considered as part of it, for which a hypothetical tenant would be rateable. This is the case if it is reasonable to suppose that the hypothetical landlord would provide the things in question.

2. Machinery or chattels reasonably likely to be found by the hypothetical tenant, being not essential to make the premises fit for occupation, are not liable to be rated or to be taken into consideration.

3. Machinery and plant, although not liable to be rated as personal chattels, or because not part of the rateable hereditament, may be taken into account as enhancing the rateable value of the hereditament (*i.e.*, by increasing the rent which the hypothetical tenant would give) when such things are there for the purpose of making, and do make, the premises suitable for the particular purpose for which they are used, even though such machinery and plant are not physically attached to the premises.

Machinery and plant are not rateable if they are only of value when used in connection with a mine which is of no present value, as where they are used only for the purpose of endeavouring to pump out the water from drowned-out seams of coal. In such cases there is no beneficial occupation. The present value is the basis, not some possible future and contingent benefit.¹

¹ *Tyne Coal Company v. Wallsend (ante)*.

Rateable Value.

In every rate-book there is a column for the gross estimated rental which has been defined above as the rent at which the hereditament might reasonably be expected to let from year to year, free of all usual tenant's rates and taxes, and tithe commutation rent-charges, if any. The rate is, however, computed upon the rateable value, which is arrived at by making deductions from the gross estimated rental as provided by the Parochial Assessments Act, 1836, referred to above. The gross estimated rental is usually about 6 per cent. less than the corresponding income tax assessment, and net rateable value is usually another 15 per cent. less.

The question arises as to how is the "gross estimated rental" to be fixed. What rent would a hypothetical tenant give for the mine in its present position? One of the grievances of mineowners is that there is no uniformity in the system of valuation throughout the country. Again, it is a well-known fact that collieries within the same district often differ considerably from the point of view of natural advantages. The output of coal and the selling price per ton may be for all practical purposes equal in the case of two collieries, yet through the presence of a few important faults in one and the absence of faults in the other, the one has considerably higher working expenses to be taken into account as compared with the other. Appeal on the ground of excessive assessment would involve the disclosure of information which no mineowner would ordinarily care to contemplate.

The first case upon the mode of assessing coal mines

was *Rex. v. Attwood and Others* (1827). In this case it was stated that the first appellant, Attwood, was the proprietor as well as occupier; that he had expended £10,000 in planting and setting the mine to work, and that the full annual value of the mine, after deducting expenses, was £428 9s., the amount upon which he was rated. The other appellants were lessees, who had expended different sums in planting and setting their mines to work. These were rated upon the royalties paid or estimated to be paid. Two other contentions were raised for the appellants—the one was that the expenses of planting and setting the mine to work was an expense to be recouped before ascertaining the rateable value, the other was that the subject-matter was part of the rate: that all other things mentioned in the Act of 1601 as the subject-matter of rating are of a permanent nature, but that coal in a mine was the capital, the soil, and freehold, and the sum produced by the sale of it should be considered as the purchase money of part of the estate; and it was suggested that the rate should, therefore, not be upon the whole sum, but upon its interest only. Judgment was, however, given against the appellants on both points. Abbott, C.J., in giving the judgment of the Court, said: “We
“ are all of opinion that the owner and occupier of a
“ coal mine should be rated at such sum as it would
“ let for, and no more. As to the other points, the
“ first was, that the rate should not be imposed upon
“ the coal produced, because that was part of the
“ realty. It is the first time that such a proposition
“ has ever been submitted, although many coal mines
“ in various parts of the country have constantly
“ been rated, and the argument in support of it is
“ wholly untenable. The Legislature has expressly made

“ coal mines rateable, and they must be rated for
“ what they produce, viz., the coals. Slate quarries
“ and brick earth are also exhausted in a few years, but,
“ nevertheless, the rate is always imposed upon that
“ which is produced. The other argument was that the
“ rate could not be imposed until the expense of plant-
“ ing the mine had been recouped. But I cannot
“ discover any distinction between expenses incurred in
“ bringing a mine to a productive state and in building
“ a house. The attempt to distinguish them is perfectly
“ novel, and if a house is to be rated as soon as built
“ and occupied, it must follow that a coal mine is rate-
“ able as soon as it is set at work and produces coal,
“ although it may happen that the expense of sinking
“ it may never be recovered. If the tenant of a mine
“ expends money in making it more productive, that is
“ the same as expending money in improving a farm, or
“ a house, *in which cases the tenant is rateable for the*
“ *improved value.*”

Referring back to the definition of “gross estimated rental” above, it is obvious at once that in the very large majority of cases it is impossible to assess collieries on this basis. It is permissible in such cases to arrive at the net rateable value by what is known as the railway method, that is, taking the occupier’s receipts in the preceding year, and then deducting therefrom allowances for capital and other expenditure which cannot be called rent.

The famous case of the *Denaby and Cadeby Collieries Company v. The Doncaster Union* (1898) is of special interest in this respect. The colliery company put forward evidence that the best and only fair method of arriving at the net rateable value was by the railway method. If this was admissible it would work out

substantially correct. The union contended that this evidence was inadmissible.

The Quarter Sessions appointed Mr. R. M. Littler, K.C., as arbitrator, and the following questions were submitted to the Court, Q.B. :—

- (1) Is the evidence put forward by the appellants admissible?
- (2) Is the rent on lease, whether actual or estimated, under such circumstances binding, or any evidence in ascertaining the value for rating purposes?
- (3) Are the appellants, where the gross and rateable values are entered at the same amount, entitled to claim to deduct from that gross, as shown in the rate-book, outgoings by whomsoever paid, and so arrive at the net value, which in such case must necessarily be less than the gross?

Mr. Justice Day delivered opinion as follows :—

“ The first question, I think myself, is clear that the evidence put forward by the appellants is admissible. What value the arbitrator will attach to it I do not know, but it seems to me it is clearly admissible this is an exceptional case. There is nothing, he says, with which he could compare it. He knows of no collieries that are let by the year, and I suppose no one has ever yet heard of a colliery being so let. It is clearly an exceptional case, to be dealt with exceptionally. These rating questions are to be determined as nearly as possible correctly, and therefore, of course, in the most practical way that is available. It seems to me that this is a proper way of dealing with it. Then the second question is one which, by consent of counsel on both sides, has been disposed of already, and I do not think I need say any more about it. The third question is a question with reference to which, really practically, I do not see much difficulty. The gross has been put down, and I should assume that the

figures have been arrived at rightly. I do not see how we are to get at the net by going through the gross practically. I do not know that we can alter the words "gross" and "net" in dealing with them in the ordinary way. I do not well see how you can proceed to arrive at the net until you have found what the gross is. The gross, I have always understood, to be something from which you take off certain figures which you are entitled to take off. You get the gross first and then the net. The gross is an ascertained figure which has been put by the parties as gross, and, having put it down, they must abide by it. I really do not see that we ought to interfere with it in any shape or way."

Mr. Justice Phillimore agreed, as follows:—

"I am of the same opinion. I think it must be taken from the finding of the arbitrator that this colliery is such an exceptional colliery that the assessment can only be arrived at by the method applied to what are called 'exceptional cases'; and therefore the evidence put forward by the appellants is necessarily admissible. The second question must be answered in the sense already indicated by the Bench, and now agreed upon in words upon both sides. With regard to the third question, I think the ratepayers are entitled to the benefit of the finding of the assessment committee as to the gross, and that the gross not being appealable from now the net must be worked out by making such deductions, if any, as are properly to be made from the gross. I propose, with my learned brother's consent, that we should answer question No. (3) in the way contended for by Mr. Cripps, that the appellants in such a rating as the three above named, where the gross and rateable are entered at the same amount, are entitled to treat the gross as an ascertained figure, and to make therefrom such deductions as they can support. We do not answer exactly the words of the question, because I do not want it necessarily to be assumed that there must be any deduction. Mr. Bosanquet has pointed out that

there may be no deductions, and therefore the gross and rateable may be exactly the same."

In this case it was further decided that rent payable under a mining lease for a term of years is "evidence, " but not binding, or excluding consideration of the " lessee's outlay in permanent improvements so far as " the outlay may be held to affect the rent, and having " regard to all the circumstances."

The following is the method in which the net rateable value would be arrived at under the above ruling:—

From the gross receipts from sale of coal raised at the colliery during the preceding year—

Deduct discount, bad debts, cost of coal getting, and other working and management expenses above ground and under ground:

Occupier's share of the profits for interest on capital, trade profits, and an allowance for risk and casualties.¹

Rates and taxes.

Leaving "gross estimated rental" available for hypothetical landlord.

Deduct therefrom repairs and renewals² of buildings, main roadways, main airways, and other permanent works,³ insurance, sinking fund, and other expenses necessary to maintain the premises in a state to earn the rent.

Leaving "net rateable value."

¹ Interest on capital and trade profits have been allowed at 15 per cent., and risks and casualties at 2½ per cent. to 5 per cent.—Final Report, Royal Commission on Local Taxation (1901), p. 57.

² *Rex v. Lower Mitton*; *Rex v. Cambridge Gas*; *Rex v. Wells*. (See Appendix V.)

³ *Brown v. Rotherham Assessment Committee* (1900). In this case the expense of keeping in repair the permanent main road and permanent main shaft in a mine being necessary to maintain the mine in a state to command the rent were held to be proper deductions.

In a Paper¹ read before this Institution in 1899, Mr. (afterwards Sir E.) Boyle, K.C., who had appeared for the appellants in the above case, discussed this method, and illustrated it by figures. This method appears to be the most reasonable one on which a colliery may be assessed, and has been advocated in Papers by Mr. G. Humphreys-Davies² and Mr. E. J. Castle, K.C.³

As illustrating the diversity of practice in different unions, Tables V. and VI. are taken from the Paper by Mr. A. Hassam,⁴ previously referred to. These two tables bring out in a striking manner the inequalities in the system of valuation.

Since Mr. Hassam wrote his Paper, the Departmental Committee on Local Taxation, appointed in 1912, have published their final Report,⁵ from which it is evident that practically no change has taken place in the system of assessment and in regard to the inequalities of burden as between different parishes.

The author of this Paper has not been able, owing to lack of time and opportunity, to study the evidence laid before this Committee carefully, and discussion of such evidence and of the Report will therefore be reserved to the later Paper.

The author proposes, in the second part of this Paper, to deal specifically with the effects of recent Finance Acts and the rating of mines, and to compare the system outlined above with systems in vogue in

¹ "The Rating of Coal Mines," *Transactions*, Surveyors' Institution, Vol. XXXI., p. 143.

² *Transactions*, Institute of Mining Engineers, 1892. Vol. III.

³ *ibid.*, 1894. Vol. VII.

⁴ *ibid.*, 1905. Vol. XXIX.

⁵ Cd. 7315 of 1914.

other countries. It is hoped that this will render the whole discussion of the subject fairly complete.

He is largely indebted to the following works of reference and papers for information :—

Castle's " Law and Practice of Rating." 4th ed. (1903).

Palgrave's " Dictionary of Political Economy."

Cockburn's " Law of Coal."

Dowell's " Income Tax Laws " (revised by Piper).

Plehn's " Introduction to Public Finance."

Statistical Abstracts (published by Stationery Office),
1917.

Seventeenth Abstract of Labour Statistics (Board of
Trade), 1915.

Mr. Hassam's Paper on "Taxation of Collieries," *Transactions*, Institute Mining Engineers, 1905.

Final Report of Royal Commission on Local Taxation,
1901.

TABLE I.—PRODUCTION.

MINERALS.—GENERAL SUMMARY OF QUANTITIES AND VALUES, 1899—1913.

QUANTITIES.

Year.	Coal.		Iron Ore.	Clay and Shale.	Oil Shale.	Salt.	Slate.	Limestone (including Calcaspar)	Lead Ore.	Tin Ore dressed.	Zinc Ore.	Year.
	From Mines.	* From Quarries										
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	
1899	220,085,368	9,413	14,461,330	15,064,857	2,210,824	1,914,893	639,840	12,302,890	30,999	6,392	23,135	1899
1900	225,170,163	11,137	14,028,208	14,049,694	2,282,221	1,861,347	585,859	11,905,477	32,010	6,800	24,675	1900
1901	219,037,240	9,705	12,275,198	14,161,877	2,254,356	1,783,056	488,772	11,180,579	27,976	7,288	23,752	1901
1902	227,084,871	10,171	13,426,004	15,304,136	2,107,534	1,893,881	517,363	12,172,851	24,606	7,560	25,060	1902
1903	230,324,295	10,174	13,715,645	16,198,021	2,009,602	1,886,992	531,612	12,222,971	26,567	7,381	24,888	1903
1904	232,411,784	16,488	13,774,282	15,948,915	2,333,062	1,891,633	563,170	12,043,135	26,374	6,742	27,655	1904
1905	236,111,150	17,786	14,590,703	15,134,754	2,496,785	1,889,910	514,524	12,501,780	27,649	7,201	23,909	1905
1906	251,050,809	16,819	15,500,406	15,291,352	2,546,522	1,965,151	492,663	12,758,588	30,795	7,153	22,824	1906
1907	267,812,852	18,110	15,731,604	14,827,895	2,690,028	1,984,656	443,554	12,509,142	32,533	7,080	20,082	1907
1908	261,512,214	16,581	15,031,025	14,407,470	2,892,039	1,843,959	414,329	11,610,656	29,249	8,008	15,225	1908
1909	263,758,562	15,750	14,804,382	14,067,810	2,967,057	1,818,519	402,184	11,811,122	29,744	8,289	9,902	1909
1910	264,417,588	15,440	15,226,015	14,090,320	3,130,280	2,050,630	416,324	12,512,736	28,534	7,572	11,238	1910
1911	271,878,124	13,775	15,419,424	13,835,038	3,116,803	2,125,275	425,125	12,183,355	23,910	7,746	17,652	1911
1912	260,398,578†	17,760	13,790,391	12,808,950	3,184,826	2,122,250	383,422	11,500,660	25,409	8,166	17,704	1912
1913	287,411,869	18,604	15,997,328	13,859,821	3,280,143	2,347,758	370,756	12,740,664	24,282	8,355	17,293	1913

* Quantity obtained from quarries under the Quarries Act of 1894, and from certain working not included under the provisions of the Coal Mines Regulation Acts or the Quarries Act.

† The output in 1912 was reduced on account of the National Coal Dispute.

TABLE I.—PRODUCTION—(continued.)

VALUES.

(i.e., Values at the Mines and Quarries.)

Year.	Coal.		Iron Ore.	Clay and Shale.	Oil Shale.	Salt.	Slate.	Limestone (including Callespar).	Lead Ore.	Tin Ore dressed.	Zinc Ore.	Year.
	From Mines.	From Quarries										
1899	83,481,137	£	3,895,485	1,542,657	553,003	644,174	1,787,071	1,335,067	296,784	£	139,482	1899
1900	121,652,596		4,224,400	1,571,043	627,844	611,920	1,528,336	1,300,314	349,094	523,604	97,606	1900
1901	102,486,552		3,222,460	1,597,482	589,162	572,990	1,304,647	1,257,381	224,109	478,559	70,764	1901
1902	93,421,407		3,288,101	1,758,884	500,804	577,333	1,501,789	1,382,132	175,962	513,872	91,207	1902
1903	88,227,547		3,229,937	1,767,981	477,312	610,633	1,581,477	1,367,733	202,492	532,450	112,864	1903
1904	83,851,784		3,125,814	1,772,020	554,346	596,785	1,678,726	1,369,610	206,238	479,633	137,012	1904
1905	82,038,553		3,482,184	1,763,008	593,334	556,437	1,466,916	1,410,526	244,752	574,183	139,806	1905
1906	91,523,266		4,085,428	1,768,023	657,928	595,984	1,232,321	1,368,375	341,405	713,184	142,054	1906
1907	120,527,378		4,433,418	1,850,357	806,323	648,596	1,178,609	1,323,624	419,247	706,700	100,533	1907
1908	116,598,848		3,724,165	1,839,772	795,257	589,339	1,031,877	1,229,155	259,408	594,800	62,892	1908
1909	106,274,900		3,678,802	1,718,056	815,937	542,324	1,007,013	1,226,967	259,254	617,376	49,320	1909
1910	108,377,567		4,022,269	1,761,410	860,827	581,504	1,063,994	1,296,169	232,346	655,871	53,398	1910
1911	110,783,682		4,035,893	1,758,466	857,120	601,324	1,050,667	1,268,853	219,314	837,957	82,690	1911
1912	117,921,123		3,703,837	1,633,736	765,730	577,473	972,022	1,207,022	295,607	1,012,290	87,867	1912
1913	145,535,669		4,543,558	1,778,071	822,394	608,869	926,739	1,369,168	293,525	960,134	69,502	1913

TABLE II.—CENSUS OF POPULATION AND NUMBERS ENGAGED IN MINES AND QUARRIES.

Class and Occupation.	ENGLAND AND WALES.			SCOTLAND.			IRELAND.			UNITED KINGDOM.		
	1891.	1901.	1911.	1891.	1901.	1911.	1891.	1901.	1911.	1891.	1901.	1911.
In and about, and working and dealing in the products of, mines and quarries	653,410	805,185	1,044,594	101,505	132,183	164,351	5,815	6,512	5,220	760,730	943,880	1,214,105
Coal and shale mine workers (excluding owners, agents, managers, and mine service)	517,110	643,654	877,147	81,708	108,109	143,500	754	863	668	599,572	752,626	1,021,315
Ironstone miners	18,231	17,013	22,306	2,862	2,424	1,996	314	132	189	21,407	19,569	24,491
Stone, slate quarries, cutters, dressers	50,576	71,832	60,180	10,126	14,690	10,516	3,447	4,280	3,239	61,149	90,802	73,935
Others	67,493	72,686	83,961	6,809	6,960	8,339	1,300	1,237	1,124	75,602	80,833	94,424
Total Population of United Kingdom	...	...	...	...	...	...	...	...	...	...	41,538,172	45,298,573

TABLE III.—SHOWING REVENUE FROM TAXATION (IMPERIAL AND LOCAL).

Year.	2	3	4		5		6		7		8	Total Contributions from Exchequer.	Total of 6 (a) and 8.
			Income Tax Revenue.		Gross Amount of Income from Mines assessed for Income Tax.		Amount received by Local Taxation (Public Rates).		Rental assessed to Poor Rates in England and Wales.				
			(a) Total.	(b) Rate per £.	(a) Coal Mines.	(b) Other Mines.	(a) Total.	(b) Per head of Population.	(a) Estimated.	(b) Rateable Value.			
	£	£	£	s. d.	£	£	£	£	£	£	£	£	£
1901-2	41,892,508	131,607,090	35,378,700	1 2	17,641,593	46,438,764	1-19	216,640,573	180,406,420	12,531,353	58,970,117		
1902-3	42,246,279	139,700,373	38,659,846	1 3	20,258,907	50,328,412	1-2	224,503,275	186,562,760	12,782,803	63,111,215		
1903-4	42,610,920	129,145,073	30,500,450	0 11	21,194,470	52,941,665	1-24	231,089,809	191,106,528	15,613,892	68,555,557		
1904-5	42,980,188	130,342,378	31,263,654	1 0	21,235,729	56,047,715	1-3	237,103,143	194,716,894	19,597,046	75,644,761		
1905-6	43,360,331	129,776,290	31,294,751	1 0	19,999,972	58,255,544	1-34	243,061,842	199,355,590	19,849,983	78,105,527		
1906-7	43,736,942	130,052,413	31,891,949	1 0	16,371,678	59,557,199	1-36	248,426,532	202,858,961	20,988,017	80,545,216		
1907-8	44,122,777	130,320,000	31,860,380	1 0	16,400,000	59,627,577	1-35	254,887,521	207,067,675	20,629,133	80,256,710		
1908-9	44,518,264	125,550,000	33,708,541	1 0	16,614,322	61,273,458	1-38	258,905,070	209,891,680	21,355,732	82,629,190		
1909-10	44,914,591	105,230,000	12,752,098	1 2	18,460,036	63,260,940	1-41	263,037,367	212,757,450	20,914,877	84,175,817		
1910-11	45,298,573	175,162,000	63,396,439	1 2	19,342,747	65,152,299	1-44	266,944,896	215,309,542	21,164,998	87,217,297		
1911-12	45,665,423	155,040,000	44,334,043	1 2	18,347,709	66,368,704	1-46	269,942,255	217,180,184	22,269,629	88,638,333		
1912-13	46,026,483	154,753,000	44,712,392	1 2	19,068,927	68,212,608	1-48	272,249,125	218,588,250	21,911,601	90,124,209		
1913-14	—	163,029,000	47,240,771	1 2	18,232,915	71,276,158	—	275,495,953	221,011,832	22,617,246	93,893,404		
1914-15	—	189,305,000	69,544,854	1 3	19,962,324	1,562,665	—	279,337,914	223,559,349	—	—		
1915-16	—	290,088,000	129,160,590	2 6	—	—	—	283,691,626	226,290,903	—	—		
Per-centage Increase 1901-14	12 per cent.	23 per cent.	34 per cent.	Nil.	11 per cent.		54 per cent.	24 per cent.	27 per cent.	23 per cent.	80 per cent.	60 per cent.	

TABLE IV.—NET RECEIPTS FROM MINERAL RIGHTS
DUTY AND LAND VALUE DUTIES in each of the
Years ended 31st March, 1911 to 1916.

Year ended 31st March.	Mineral Rights Duty.	Land Value Duties.
	£	£
1910—11	505,676	509,025*
1911—12	435,412	493,888
1912—13	273,399	436,722
1913—14	344,826	734,893
1914—15	337,226	431,961
1915—16	308,028	368,817

* Including arrears of 1909-10.

TABLE V.—SUMMARY OF THE RATING OF COLLIERIES IN ENGLAND AND WALES FOR THE YEAR 1890.*

Rate or Basis of Assessment.	No. of Unions.	No. of Mines.	VALUATION.			DEDUCTIONS.	
			Gross.	Rateable.	Average per cent.	Remarks.	
			£	£			
1. Sliding scale on value of coal, one-twelfth to one-fourth ...	7	101	93,030	81,167	14.65	15 to 50 per cent.	
2. Receipts less expenses ...	3	11	5,981	4,774	20.24	15 to 25 per cent.	
3. Output at 3 <i>d.</i> to 8 <i>d.</i> per ton, without deductions ...	5	60	73,854	73,854	Nil	—	
4. Output at 3½ <i>d.</i> to 2 <i>s.</i> 6 <i>d.</i> per ton, with deductions ...	9	175	267,938	243,041	9.33	5 to 25 per cent.	
5. Output on an unknown basis ...	11	209	527,633	415,230	19.78	Nil to 40 per cent.	
6. Amount per ton on the output for the net value, and 5 to 25 per cent. added to obtain the gross value	8	290	707,642	594,110	16.15	—	
7. Output at 3½ <i>d.</i> to 1 <i>s.</i> per ton, shafts at 1 <i>d.</i> to 1½ <i>d.</i> per ton, and machinery at 6 to 7½ per cent. of the capital value	14	301	620,963	557,743	11.64	Nil to 33 per cent.	
8. Output, and separate valuation of machinery, &c. (no basis stated)	11	153	401,881	351,580	12.47	Nil to 25 per cent.	
9. Sliding scale of 2½ per cent. of the selling value of the coal, plus £5 per acre for land	1	12	4,777	4,777	Nil	—	
10. Royalties and rents, without deductions ...	5	43	11,241	11,241	Nil	—	
11. Royalties and rents, with deductions ...	25	131	96,668	81,438	15.00	4 to 25 per cent.	
12. Royalties and rents, plus valuation of machinery, &c. ...	8	64	81,556	73,714	9.57	No deduction on coal, but only on machinery, &c.	
13. Royalties and rents, plus valuation of machinery, &c. ...	9	212	133,272	114,770	12.60	—	
14. Acreage, up to £120 per acre... ..	3	44	27,899	25,754	13.79	Nil to 25 per cent.	
15. No basis stated	6	34	65,653	57,140	12.94	Nil to 20 per cent.	
16. Professional valuers—basis not stated	20	245	463,609	399,627	15.89	Nil to 42 per cent.	
TOTALS	145	2,085	3,594,597	3,087,960	14.13	—	

* "Taxation of Collieries," by Mr. A. Hassam.—Transactions Institute Mining Engineers, 1905.

TABLE VI.—TONNAGE WROUGHT, AND GROSS AND NET RATEABLE VALUES FOR THE COUNTIES OF ENGLAND AND WALES.*

Name of County.	AMOUNT OF COAL.		GROSS RATEABLE VALUE.		NET RATEABLE VALUE.	
	Tons.	Estimated Value, s. d.	£	Per Ton. d.	£	Per Ton. d.
Cheshire	620,101	7 0	18,161	7·03	15,907	6·16
Cumberland	1,739,491	5 9	40,749	5·62	34,931	4·24
Derby	10,093,222	7 9	87,373	2·09	74,498	1·77
Durham	30,307,177	5 2	678,742	5·37	603,381	4·78
Gloucester	1,359,814	8 10	23,349	4·12	21,144	3·81
Lancashire	21,707,867	6 6	522,827	5·78	432,931	4·76
Leicester	1,336,547	7 1	25,323	4·54	22,213	3·99
Monmouth	6,751,308	7 5	161,329	5·73	154,279	5·63
Northumberland	8,794,005	5 4	172,010	4·68	147,786	4·03
Nottingham	6,582,582	7 0	196,349	7·16	165,011	5·74
Salop	710,490	7 0	16,025	5·42	14,622	5·00
Somerset	876,254	8 1	15,587	4·27	13,177	3·61
Stafford	13,937,406	6 5	273,698	4·72	229,072	3·93
Warwick	1,700,490	7 0	19,015	2·68	15,529	2·19
Westmoreland	1,246	7 0	75	14·51	70	12·69
Worcester	893,880	6 5	24,470	6·57	20,714	5·53
Yorkshire	21,976,027	6 6	552,139	6·00	479,900	5·23
Brecknock	944,652	6 8½	23,650	6·00	19,726	4·87
Caernarthen	2,180,316	6 3	30,533	3·35	27,483	3·02
Denbighshire	715,183	6 3	4,531	1·52	4,252	1·42
Flint	20,297,004	8 2	714,063	8·44	587,851	6·95
Glamorgan	71,271	9 6	1,840	6·19	1,381	4·64
Pembroke						

* Extracts from Mr. A. Hassam's Paper on "Taxation of Collieries," Transactions Institute Mining Engineers, 1905.

APPENDIX I.

Rex v. Parrott.

In this case it appeared that there had been a clear profit arising from the occupation of a coal mine under a lease, but it was not sufficient to pay the rent reserved, which was one-sixth of the gross receipts. The Court held that the occupier was rateable on the profits made, though it appeared that he had made an unprofitable bargain.

APPENDIX II.

Staley v. Castleton.

In this case it was argued that a mill had a value, as a tenant would take it for a *term of years* at a rent, in the hope that trade would revive. But, Blackburn, J., said: "That is not the way the probable rent is to be arrived at. That would change the words of the statute, and instead of the words to let 'from year to year,' would introduce the words 'for a reasonable number of years.' The result would be that if a man was driving a shaft with the expectation of meeting a valuable vein of minerals, he would be rateable upon some probable value for those minerals before he ever reached them, and though he was deriving no profit whatever from his labour and expense. . . . Deferred and reversionary prospects are not to be taken into account."

APPENDIX III.

Tyne Coal Company v. Wallsend.

In this case the question turned upon the rateability of lands, buildings, engine plant, railways, &c., used for the purposes of pumping out a coal mine which had for many years been flooded and unproductive.

The Court of Common Pleas held, upon the authority of the Metropolitan Board of Works cases, that the company were rateable for the surface land, because that had a value independent of the mine; but the rest of the property was "a part of a valueless whole, and therefore not rateable, though a whole which in past years has been, and which may again become, of considerable value."

It was argued that, as the property was in use for clearing the mine of water, it was beneficially occupied, being usefully employed for making the mine ultimately profitable. It was, however, held that land was not to be rated in respect of some future and contingent benefit, but upon its present value, Grove, J., said: "The engines and pumps have not been able to clear the mine, and though there may be a bare possibility of the mine becoming of value, I see no reasonable probability of it ever yielding coal, and therefore I see nothing for which a tenant would give a shilling more rent for having these engine-houses and machinery in addition to the land."

APPENDIX IV.

Rex v. Bedworth.

In this case a coal mine becoming unproductive, ceased to be worked, though the occupier still remained liable for rent to the lessors. It was held that the occupier was not liable to be rated. The fact that the tenant was still liable for rent under his lease did not constitute him an occupier.

APPENDIX V.

Ree v. Wells.

In this case Cockburn, C.J., said: "The second question submitted to us is whether any allowance should be made in respect of any contingent or future renewal of the buildings or machinery. We are of opinion that such allowance ought to be made. Farm buildings and machinery are, by the effects of weather, wear and tear, reducible to a state which will render them unworthy of repair, and necessitate their reconstruction. They cannot at length be kept up but at an expense which renders it practically impossible, because not reasonably prudent, to keep them up. Provision made for a future liability to reconstruct them, involving as it ought to do a providential parsimony as respects all but temporary and indispensable repairs, is an expense which may be properly included among the expenses necessary to maintain an hereditament, consisting in parts of subjects perishable, in a state fit to command the rent, and which it does in fact, while standing and in use, command. There seems also no distinction in principle between a sum annually laid by to make good, where it shall become necessary, an inevitable loss by the destructive agency of time, and a fund laid by for an indemnity against a loss by fire, or storm, or other peril insured against."

DISCUSSION.

Mr. JOHN WILLMOT (Member of Council) said he had great pleasure in rising to propose a hearty vote of thanks to Captain Bowen for his Paper, which he was sure would prove of great use to The Institution, especially when followed by the second Paper setting out in greater detail the result of the incidence of taxation. The Paper they had just heard afforded a capital introduction to that subject, and might be regarded as an historical sketch which must have taken Captain Bowen considerable time and trouble to prepare.

The whole question of taxes and duties was one of great importance. There was no doubt that these charges were gradually eating very largely into the *corpus* of all estates, and that land which gave, practically, the lowest rate of interest of all investments was subject to the highest charges for taxation and rating purposes. That was a serious matter which concerned all of them, and anything to mitigate it and to get a reduction, or a more equitable mode of dealing with those charges, would be very acceptable.

He had practically had nothing to do with mining work. All his work had been carried on as a surveyor on the surface of the ground. In general practice he had the management of estates which included collieries and the settlement of duties arising on death or sales; but in the case of mines the figures were founded on the reports of mining engineers as to what was the probable working life of the mine and the income it was expected to get from it, so that he could look at it only from that point of view. But what he had found was that the

duties imposed were having a serious effect in restricting the enterprise of those who formerly were bold enough to venture on the development of mineral and other estates. It was generally admitted that the erection, by the speculative builder, of houses suitable for artisans had been practically put a stop to by the provisions of the Finance (1909-10) Act, 1910, where the increment duty placed restrictions on the erection of houses. All those duties, as he had said, were growing, and no doubt that would gladden the hearts of the party who advocated the nationalisation of the land; but he hoped it would be some time before we came to that.

In considering the charges on property set out in detail in the Paper they all applied to land, but he thought they required some modification when applied to minerals. Taking the charges in the order set out in the Paper, they had, first, the super tax, which was really a continuation of the income tax. That, of course, was chargeable on income from whatever source it might be derived, investments in land, collieries, or any other source, and did not particularly affect the taxation of collieries.

In regard to the land duties, dealing first with increment value duty, he understood that it was not chargeable on minerals included in a lease or worked prior to the passing of the Finance Act, 1909. Subsequent to that date it was charged and assessed in the form of annual payments.

Reversion duty was, he thought, under Section 22 (1) of the Act not payable on the termination of a mining lease.

Undeveloped land duty did not apply to minerals underlying the land, so would not affect the working of a colliery.

The Paper went very fully into questions of rating, which was an extremely large question. He felt great diffidence in saying anything about it in the presence of their President, who was a great authority on the subject, but he had noticed the extraordinary number of methods adopted as the rate or basis of assessment. There were sixteen mentioned in the Paper. He did not pretend to be an expert on the rating of collieries, so he could not say which method was better than another, but it seemed rather astounding to have sixteen! They, no doubt, related to methods which might be applicable to particular districts, or the working of mines with which he was not acquainted.

They were much indebted to Captain Bowen for his Paper, and he should look forward with great pleasure to the second part, when further details and examples would doubtless be given of how the duties and systems of rating were applied in concrete cases, so that they might be fully discussed by those who were more competent to do so.

He begged to propose a vote of thanks to Captain Bowen.

Mr. THOMAS JONES (Fellow) said he was at some disadvantage in seconding the vote of thanks to Captain Bowen for his excellent Paper, as, having been away in the country, he had only that evening had it put in his hands for the first time.

There were many points in the Paper upon which one could, with time, make useful observations, but at so short notice it was very difficult to do this. He might therefore, perhaps, be permitted to say more later on when Captain Bowen read his second Paper,

which would no doubt satisfactorily complete the subject of duties on development.

There were one or two points to which he would like to refer—on page 124, for instance, the quotation, which the author gave from Lord Blackburn: “But
“ the object is to grant a revenue at all events, even
“ though a possible nearer approximation to equality
“ may be sacrificed in order more easily and certainly
“ to raise that revenue.” Well, we had to raise a revenue in any event, and that revenue, whether it were a rate or whether it were a tax, had to be met, and the unfortunate result was that many of our rating authorities had different methods of arriving at a satisfactory conclusion.

He thought that Table V., prepared by Mr. Hassam, was very enlightening as to the different bases on which different authorities assessed. It was a revelation to him to learn that there were so many different methods of valuation. He was not a rating surveyor, but an engineer, and was more acquainted with the practical part of the industry; but take No. 3, for instance, “at 3*d.*
“ to 8*d.* per ton, without deductions.” There were only sixty mines so rated in the kingdom, whereas all the rest had deductions, except (No. 10) where the royalties and rents were without deductions. Then take No. 12, “Royalties and rents, plus valuation of machinery,
“ &c.” Here there were sixty-four cases with no deductions for the mineral worked, whether coal or other material, but very considerable deductions on plant and machinery. That was his experience in the whole of the North Wales slate mines and quarries. They did not make any deductions on the material worked. They took the full royalty per ton, and treated that as gross and net; but on the machinery and plant, and buildings,

&c., they made various deductions. But the inequality shown in those tables was, to him, most remarkable.

The question dealt with by Captain Bowen as to allowing any deduction in the rating upon expenditure of capital account might next be referred to. In almost all cases, except in coal mines, the pits last for the whole life of the lease, and of course a greater or less number of seams were worked. In quarries, as a rule, especially in underground quarries, with which he was connected, they, every year, worked out a considerable development expenditure on abandoned levels and inclines, and various means of access, by the substitution of new underground roads. The rate or tax collector would not allow any deduction for that constant necessary expenditure, which was simply maintaining the hereditament in a rent-producing condition. He thought it was rather hard that they should have to pay rates on their maintenance cost, as it was only reinstatement, and nothing more.

He thought that Captain Bowen's remarks on page 146 with regard to the ruling of the Court in the case of *Denaby and Cadeby Collieries Company v. The Doncaster Union* (1898) bore out the point he had already mentioned—that it was only expenditure necessary to keep the premises in a state to earn produce.

That was a matter with which he would like Captain Bowen to deal with in his second Paper. Then with regard to the methods of assessment, he did not think that he could add anything of particular value for the information of the Members of The Institution, preferring to leave that to the President, who was an acknowledged authority upon all methods of assessment, and who, to his own knowledge, had had as much to do

with quarries and mines as any other member of the profession. He could only say that in the Welsh districts the custom was to assess the rates upon the output, and the taxes, of course, upon the net profits. How those net profits were arrived at he would not like to say, because he was not speaking from authority, as he did not deal with the accounts. But he knew that circumstances of different position or situation had a very considerable bearing upon the royalties and upon the rates. They might be getting the very same minerals but work them from different districts or quarries, and they would find that in the one case, say, in Merionethshire or Carnarvonshire, the royalties would be 8s. per ton on manufactured material, and in another it would be 1s. 6d., probably on equally long leases, and in each particular district deposited in the same vein. Thanks to this they had in the Welsh districts lately some very strenuous appeals, and they were getting their rates reduced, because it was absolutely impossible, with the additional cost of labour and materials, to work the mines at anything like the profit that had been formerly received, and no tenant with any discretion would pay the royalties that had been paid in the past.

Another question which Captain Bowen raised was that of paying rates upon all the plant and machinery on the premises. Now in his own case they had been in a peculiar position in that respect. They scrapped the whole of their steam plant and machinery—something between £25,000 and £30,000 worth of property—in order to instal electrical machinery. That electrical machinery cost some £20,000, but owing to the uncertainty of the current, which was generated some 10 or 12 miles away (under Snowdon), they did not at first know whether they were going to be served with continuity—

they decided to retain the abandoned machinery along with the electrical machinery in all their quarries until within the last two years. But they were assessed on the whole value of the steam plant and machinery, although they never used it at all, and had substituted other machinery, which was in constant use. Now they had scrapped it, and the assessments were being reduced, and in fact had been reduced from something like £100,000 to less than £50,000.

That was only an illustration of what Captain Bowen had said about owners being made to pay on all plant and machinery upon their premises whether usable or not.

However, he did not want to take up time any longer, though there were various other points of which he had taken note, and perhaps might be allowed to make some remarks upon them at a later period. He cordially seconded the vote of thanks to Captain Bowen, feeling sure that those Members of The Institution who were interested in questions of rating and taxation would, when they went through the Paper, appreciate the great labour devoted to its preparation.

Mr. G. TURVILLE BROWN (Fellow) desired to add one more word of thanks to Captain Bowen for his most able and interesting Paper. He assured him that the smallness of the attendance was not to be regarded as any slight, but simply as an index of the times in which they lived.

With regard to the epitome of the history of taxation and rating in this country, as set out in the Paper, the thing that struck him most was the extraordinary complex state into which the whole matter had got. It seemed to him that if the country's present need

was for a great soldier, there would be an equal need for a great lawgiver at the end of the war if this corner of Europe was not to become a "fouled nest," and development stopped by the weight of taxation. As Mr. Jones put it, the State had to get the money somehow, but it must be got in a way that would not stop development and production generally. It had to be remembered that immediately the war was over we were probably going to be faced with fiercer competition than we had ever had before, and the struggle would be very keen.

With regard to the assessment of mines for taxation there were two observations he would like to make. The first was that in his experience the amount of time that the responsible officials of every mining company in this country had to devote to this question was already far too great. His second point was that he did not think any ordinary surveyor of taxes ought to have to deal with these questions at all. The surveyors of taxes, good fellows as they are, had an enormous amount of work on their shoulders, and this particular branch of the work was so technical, and was so dependent upon a knowledge of the actual facts that occur under and above ground, that no surveyor of taxes could really be expected to cope with it. The whole thing ought to be done by a properly constituted body of officials, to meet the colliery or mine-owning companies' officials, and settle the assessment in each case, having regard to the particular circumstances of the mine. It seemed to him that it was almost a scandal that this thing had not been tackled before, and that there should be sixteen separate schemes under which those assessments were made in different parts of the country. The whole business required codifying,

and he hoped that when there was more leisure after the war this would be one of the first things attempted, if not done.

He had very great pleasure in thanking Captain Bowen and telling him that he had read his Paper with great interest, and was looking forward to the second Paper with equal pleasure.

Mr. J. I. DAVIDSON (Member of Council) remarked that he had little to add to what the other speakers had said, except an expression of the Members' indebtedness to Captain Bowen for the great trouble he must have taken in the preparation of the interesting Paper which they had heard read. Like one of the previous speakers, he was employed on the surface and not in the bowels of the earth, but at the same time he had a considerable amount to do with mineral companies.

In respect of rating there was one item that he was not sure he had observed in the Paper, *i.e.*, the amount of annual damage to which mineral companies were subjected from subsidence of the surface and other incidental injuries caused to land, which he certainly thought should form proper deductions in estimating the profits or the rateable values generally. Such payments as those to which he referred were most usually made to agricultural tenants, but occasionally they accumulated and were chargeable to the land-owners on the lapse of the leases. During the last two years he had had to deal with a claim of no less than £42,000 in connection with damage to an estate as a result of land occupied during three successive mineral leases which had come to an end. Well, he might mention that that claim did not result in an award of anything like the sum alluded to, although

curiously enough the landowner who claimed it was personally very largely interested in the mineral undertaking. But it was perfectly clear that that raised a point which ought to be carefully kept in view by the rating authority, because in the end that mineral company was found liable for a substantial sum, though nothing like that claimed; this really represented a reduction of their income and revenues during the period of the working of the mine.

He would not, however, take up further time except to repeat his expression of appreciation of the Paper which had been read, and express his great respect for the capacity of the gentlemen who were able to estimate the value of things that were unseen.

Mr. R. T. REES said that with reference to the taxation, rating, and valuation of minerals, he would be very much obliged if Captain Bowen, in his next Paper, would deal with the question of valuation of unlet minerals. He had himself to make such a valuation, and he would like the observations of the author on that point.

The following written communications were received:—

From Sir FRANCIS BRAIN (Fellow).

I have read Captain Bowen's Paper on "The Taxation, Rating, and Valuation of Mines" with the greatest interest. The mining industry is under obligation to him for so carefully collating mining taxation facts, and going into this very important subject so thoroughly. I shall be looking for his second Paper with much interest. Mines, in my opinion, are most

unfairly treated under the present taxation law. That the owner of a mine who is daily exhausting the *corpus* of his property should have no allowance made for capital exhaustion is, I venture to think, most inequitable.

I greatly regret a prior engagement makes it impossible for me to be present on the 25th when Captain Bowen's Paper will be read, and as chairman of the Mining Surveyors' Committee of this Institution, I would like to say how much we appreciate it.

From Mr. THOS. H. BAILEY (Fellow).

I understand from the title of the Paper that the author proposes to deal with his subject under three main headings, and that the present Paper deals with two, viz., Taxation and Rating.

If the third section is dealt with in as brilliant and comprehensive a manner as the first two, the completed Paper will be invaluable as a handy epitome of an important but most difficult subject.

In referring to tables used by my late father, Mr. Samuel Bailey, there is a certain amount of amusement, seasoned with alarm, in finding that income tax tables stopped at the rate of 7*d.* in the £. This affords an instance of the great difference between the problem of the Paper as it is to-day and as it was not so very long ago.

As early as 1870 my father settled the assessment of collieries on the basis of a sliding scale dependent upon the selling price and output of the colliery for the time being, subject to the deductions demanded by special circumstances, and I believe he was one of the first to adopt this method.

When Mr. Bowen comes to deal with the question of

the valuation of mineral property, I should be grateful if he would give his views on the best method of taking into consideration the important changes in the money market of late years, and particularly in consequence of the war, and the fact that a high rate of interest on investments will be the rule for many years to come. Is it not time that the stereotyped "3 per cent." rate for reinvestment to replace capital should be increased, and is it wise or accurate to calculate the security of mineral property of a speculative nature on a flat rate for the full term?

In my own professional experience I am up against important questions relating to increment value duty, questions which may have to come before the Courts.

This duty, in my experience, has a bad habit of being inequitable. I have a case in point where my valuation of a mineral property as at 30th April, 1909, is almost exactly correct on the calculated then value according to the actual royalties received from the property. Owing, however, to causes utterly beyond the control of either lessor or lessee, the colliery workings have had to concentrate in my client's property for the past two or three years. The consequence is that a fictitious "increment value" has been created, but a very real "duty" demanded.

At present I see no prospect of redress, and suppose that my client's only consolation will be that "To provide that taxation shall fall entirely on income and not at all on capital is beyond the power of any system of fiscal arrangements."

The case in question is to all intents and purposes a harsh tax on capital.

Another of my problems is whether, and, if so, how, the 10 per cent. allowance (not exceeding 25 per cent. in

five years) in Section 3 of the Finance (1909-10) Act, 1910, is applicable to minerals. As the legal decisions stand at present it seems that the mineral sections of the Act are to be considered altogether by themselves (14 years' leases for example), but while this seems to be the law it is very evident to me that it is absurd.

From Mr. ARTHUR HASSAM (Fellow).

I have read the proof of Captain Bowen's Paper with considerable interest, and propose to offer a few remarks dealing with the latter part, in which he discusses the question of the rating of mines.

Since I prepared my Paper, to which Captain Bowen makes such kindly reference, I have had considerable experience in the assessment of special properties, such as coal and iron mines, iron and steelworks, &c., and my previous views have been strikingly confirmed as to the general inequalities of methods which have obtained in the past. This partly arises from a lack of fixed principles and partly from the inherent difficulties of the question, as there is probably no class of property in the world which has such varying and difficult conditions as mining properties, and it is only an intimate knowledge of the subject, and a general exercise of common-sense, sometimes without too keen a bearing of the strict legalities of the position, that enables anything like an equitable adjustment to be made.

My experience strongly supports the view that the most equitable arrangement in regard to rating of collieries and ironstone mines, and works of similar character, is based upon the tonnage system of treating the whole of the plant and machinery, buildings, sidings, &c., as appurtenances, covered by the basis tonnage price.

Under this system appurtenances would include only such plant at the colliery as would be requisite to put the produce on the market properly separated and cleaned, and would not of course include properties which at some collieries might appear almost to be adjuncts, such as coke ovens, by-product plants, &c., which should always be regarded as separate hereditaments.

Although this method largely simplifies and tends to render uniform the practice of assessing mines, it is not without its difficulties in arriving at the tonnage, unless the output is taken purely as weighed over the pit-bank machine. If, on the other hand, the tonnage of saleable produce is taken as the basis, the calculation becomes complicated by numerous deductions for fuel, refuse by washing plants, screens, &c., but on the whole, whichever of these two methods is adopted, there is no doubt the tonnage system works out with the greatest satisfaction, and gives a greater sense of equitable dealing to the occupiers.

Having obtained the outputs it is then necessary to fix the base price, and it is in fixing this price per ton that technical knowledge of the circumstances at the various collieries is requisite if anything like a just assessment is to be made, and in arriving at it the economic side of the question must, in all fairness, be taken into account.

I am also strongly of opinion that this tonnage principle is equally sound if applied to coke ovens, ironworks, &c. There is a certain relationship between the amount of iron, steel, or coke produced in their respective plants and the amount of original capital expenditure; and there are times when production may be reduced or increased for longer or shorter periods,

and in such cases a tonnage basis would enable automatic adjustments to be obtained. Again, of course the crucial point would be the basis price, but with common-sense and common honesty and fairness between the parties the difficulties could readily be surmounted.

Other serious points dealt with by the writer are the gross and rateable values and the question of statutable deductions. As shown in Table V., extracted from my own Paper on "Taxation of Collieries," the average amount of deductions from gross to rateable was 14.13 per cent. Since then, as Captain Bowen points out, it has been held that the cost of repairs to main roads, airways, &c., must be regarded as statutable deductions, with the result that the gross value must be enormously in excess of the rateable value for the valuation to be sound. This, again, leads to difficulties with the county rate basis and the Income Tax Commissioners, and is an aspect of taxation law which ought to be legislatively dealt with.

From Mr. W. M. MILLER (Fellow).

In the comprehensive review of existing taxation and rating as affecting mines, which forms the subject of Captain Bowen's preliminary Paper, it might have been well to have mentioned the method of application of increment value duty to mines (Finance (1909-10) Act, 1910, Section 22), as this differs so materially from its application to land, and has a most important bearing on the question of valuation of minerals which were undeveloped at 30th April, 1909.

Mention might also have been made of Excess Mineral Rights Duty (Finance (No. 2) Act, 1915, Section 43), as, should this prove to be more than a war-time expedient, it will doubtless tend in large

measure to the abandonment of sliding-scale royalties where these exist in favour of fixed royalties, when new leases are entered into. This is a point which has considerable interest for both lessors and lessees of minerals.

As regards rateable value, the Scotch method is on the lines of No. 10, Table V., and therefore quite different from that adopted in respect of the great majority of English and Welsh mines. I am not clear as to the effect of the method which Captain Bowen describes as "the most reasonable one on which a colliery may be assessed." It seems from the footnote that the effect might be that a colliery earning 15 per cent. regularly on its capital would be rated on a minus net rateable value.

What seems chiefly desirable as regards both taxation and rating is that the wasting nature of the subject should be taken into account.

Public bodies frequently issue loans repayable in so many half-yearly or yearly instalments, a proportion of which is calculated, if invested, to recoup the lender the amount of his loan by the time the payments cease. This portion of the payments is not treated as income, and is not subject to income tax.

It seems only reasonable that royalties and lessee's profits should be dealt with in a similar way before the amount to be assessed for either taxes or rates is arrived at.

An example as to what proportion of royalties may reasonably be considered as income is to be found in the method adopted in dealing with the Crown mineral estates in the Crown Lands Act, which provides for only half the mineral revenue being treated as income.

The PRESIDENT, in putting the vote of thanks, said they were all sincerely grateful to Captain Bowen for the trouble he had taken with his most interesting Paper on a subject which absolutely bristled with difficulties from start to finish.

The motion was agreed to with acclamation.

Captain BOWEN, in reply, said he was very grateful for the kind remarks which had been made about the Paper. He was rather afraid that, owing to the limited time he had had at his disposal, it was not as satisfactory as he would have liked. Since the proof came out he had had the advantage of seeing Sir Edward Boyle's Paper on "The Rating of Coal Mines," read before The Institution in 1899, and the Members' discussion of it as reported in the *Transactions*. He would like, in his second Paper, to consider some of the points raised by Sir Edward Boyle in view of modern conditions.

One of the speakers this evening, Mr. Brown, referred to the time after the war, and expressed the opinion that it was essential that we should have some legislation or some experts who would undertake reforms in taxation, taking into consideration the special needs of the coal and mining industry with some of the other larger industries in this country. But coming up that morning he had made some notes with regard to existing conditions and the possible tendency in the future or the near future. More particularly in connection with mines, the tendency—of modern collieries, at any rate—was to recover more of the ultimate value of coal at the pit-head. Hence it was a well-known fact that the more that is done the more do profits increase as compared with the previous system. He was speaking more particularly of

the tendency to instal, at every modern colliery where it is at all possible owing to the nature of the coal, by-products plant. Of course the instalment of a by-products plant involves a great increase in capital expenditure, and therefore that meant that they had to put aside out of the annual gross receipts more towards the redemption of the increased capital expenditure. But he had known, from his own personal experience, some cases where a bare profit had been turned into a very considerable one simply by the introduction of by-products plant. Against that one had of course to set or contend with the increased wages to the miners, and possibly shorter working hours. But he had noticed in an analysis of the average selling price of coal at the pit's mouth from 1893 to 1913 that the selling price showed on an average for the United Kingdom an increase of 3s. 4d. a ton, equal to nearly 50 per cent. Taking the year 1900, with an index number of 100, they found that from 1871 to 1913 the wholesale price of coal had increased from 58·3 to 87·7, again indicating an increase of about 50 per cent. On the other hand, if they considered the changes in coal miner's wages for the period 1888 to 1913 on the 1879 standard, they found that the percentage fluctuated between $7\frac{1}{2}$ per cent. below the 1879 standard to $73\frac{3}{4}$ per cent. above it, the minimum corresponding to the year 1888 and the maximum to the year 1900, which from all indications appeared to be the most prosperous year for many years past. Those were some of the questions bound up with the whole problem of the inequality of taxation and rating of mines throughout the country. The question raised by Mr. Jones that the rates are assessed upon the output embraced the question also of the railway method. It appeared that owing to

the many uncertain factors incidental to mines and mining concerns, opinion seemed to be pretty well divided as to whether the railway method should be adopted, or whether a fixed tonnage should be levied.

The advantages, of course, of fixed tonnage were that the mineowner would know beforehand what he had to contend with; on the other hand, if they regarded the matter from the standpoint of "ability to pay"—one of the principal clauses in the Poor Relief Act—it appeared that the railway method would be the fairest method. But the railway method had this disadvantage—and this was the great objection from the point of view of mineowners—that it involved the disclosure of figures as to working costs, capital, profits, and so on, which mineowners did not care to place at the disposal of outsiders. Downstairs, before coming into the lecture-room, he had looked at the first part of a Paper read by Professor Louis of Armstrong College, Newcastle-on-Tyne, dealing with the question of the incidence of taxation of metalliferous mines. It was the first opportunity he had had of reading it. That Paper dealt with many matters of importance to metalliferous mines, and probably by the time his second Paper was ready he would have had an opportunity of reading the whole of that Paper, and would be able to bring forward the opinions of such a high expert on mining matters as Professor Louis. He thanked the Members for the kind remarks they had made, and in his written reply would endeavour to deal more fully with the points raised by the various speakers that evening.

The PRESIDENT observed that at that time of the

evening it was impossible to deal fully with the subject of Captain Bowen's Paper which raised an enormous number of questions for discussion, but he would refer to four or five points which he considered suitable for further consideration. In the first place, he had nothing whatever to say about the *taxation* of mines because the subject was so large and almost too complicated for anyone to attempt to tackle at all in such a discussion. But with regard to the *rating* of mines he could say one or two things which might start further discussion later on.

In the first place, there were really only three ways in which to arrive at the rateable value of a mine. One was to get at the rent which was being paid for it; another was to get at the rent which should be paid for it with the experience of what was being paid for other mines; and the third was to estimate the rent which the mine was really worth, taking into account what could be made out of it. The last was the "receipts and expenditure" method. Now there were objections to all three ways. In the first place, the rent which was being paid for it was fixed at a more or less remote period in the past. In other words, a rent fixed two or three years ago might be double what it would have been if it had been fixed forty years ago, but the rateable value of the mine was exactly the same. If they took the second method, that of comparing a mine with what other mines were let at, then they got into the same difficulty, because mines varied so immensely. The third method was, in his opinion, the right way to get at a true value of a mine, but then they were met with this difficulty at once, that the coalowners or coalowning companies objected to show their accounts. They had a very good reason for that objection, entirely apart

from the question of rating. They did not want to show competitors the way they worked, and the consequence was that it was very seldom one could get at the accounts. They could, however, generally arrive at the conclusion that if a company were willing to show its accounts, or were anxious to show those accounts, it was doing pretty badly. He meant that they would not go before the assessment committee and show them unless they wished to show how badly they were doing. By those means they sometimes got the rateable value reduced very considerably.

With regard to the fixed plant, he noticed that Captain Bowen said it must be taken into account, "the theory being that the output of coal would be "increased thereby." The fact was they had got to rate a mine as an equipped mine, just as in the case of a person taking a plot of land and paying ground rent and building a house upon it. One did not rate the plot of land at the value of the land alone; they had got to take the land plus house. In the case of a colliery, the royalty paid for coal and also the interest on the equipment of the mine were taken into account. It did not happen that the equipment of the mine formed so large a proportion of the total as the interest on the money spent on the house did to the total value of the property, but still they must take it into account, and if they took the royalty alone they only got a part of the value.

With regard to the deductions from "gross estimated "rental," that was such an enormous subject that he hardly knew how to start on it. But there was a case very well known to rating surveyors which had decided that once the gross estimated rental of any property appeared in the rate-book nobody had power

to increase it—neither Quarter Sessions nor anybody else. The consequence was that the appellant could say, “I do not object to that gross, but I do object to the amount taken off to represent the repairs of “the property.” A certain well-known rating firm once made hay of one of the valuation lists by that method of attack. They showed without any difficulty that the deductions—it was a point Captain Bowen had made—should have been nearer 60 per cent., because the greater part of the labour employed down below was actually involved in keeping the mine in a fit state to command the rent or to be worked at all. He meant the labour required to keep open the main ways and air shafts, which was such an enormous proportion of the total employed that the firm in question could accept the gross estimated rental in every case and get an immense deduction. Having served one hundred notices of appeal or thereabouts in 1902, only six were tried, all the others being settled.

Any rating surveyor who assessed collieries in South Wales, and gave a deduction of 14 per cent., would probably have the whole of his rate quashed, because it was not anything like enough.

With regard to by-products plant, of course it had very considerably increased the value of the property as a property, but it did not form part of the colliery company's main business, and therefore he thought it was proper to assess by-products plant at a separate figure apart from the mine, so that mines could be compared with one another, a mine with a by-products plant being quite a different property to a mine without it. They had got a separate manufacture altogether, and a similar remark might be made with regard to mines that were equipped with electrical power houses.

It was a very great improvement in mines to have electrical power houses. The old-fashioned plan of having steam engines on the surface and perhaps compressed air down below was nothing like so good. But then there was this difficulty, referred to by Captain Bowen, that they must not take into account both the power supply from the power house, and the power which was used before. That was just a practical matter, and it was a point to be remembered.

He regretted that it was too late in the evening to follow the subject further, and he must conclude by saying that they were all greatly indebted to Captain Bowen for the trouble he had taken in writing a Paper on a subject which bristled with difficulties.

Captain BOWEN has sent the following reply to points raised in the discussion on his Paper:—

In reply to the several written and spoken remarks on the subject-matter of my Paper, I have to say that I feel highly gratified at the kind expressions of appreciation of my efforts, and at the many interesting points brought under discussion. I feel obliged to defer discussion upon many of these points to my second Paper, in which I hope to deal fully with the subject from its economical standpoint. Before this second Paper is published I shall probably communicate individually with the Fellows who have taken part in the discussion, with a view to the elucidation of several points about which I am not quite clear at present.

Some of the Fellows have indicated it as their opinion that in the assessment of mines it is highly necessary that the assessors should have an intimate and expert knowledge of the subject-matter of the rate. In this I fully concur. Mining concerns are subject to so many varying factors conducive to profitable working or otherwise, that it requires many years of experience of mining conditions before one can adequately appreciate what would or would not be an equitable assessment.

The various points raised in the discussion of the Paper are collectively so complex that they require much consideration. It is evident that the existing system of rating, particularly, has many objections.

In my second Paper I shall endeavour to deal fully with the methods of assessment in various mining districts, with the whole question of valuation, together with the special points raised in the course of the present discussion.

COST OF BUILDING BEFORE AND AFTER THE WAR.

BY ERNEST H. SELBY (VISITOR).

*Read at the Ordinary General Meeting of THE SURVEYORS'
INSTITUTION, held on Monday, 8th April, 1918.*

ARTHUR LYON RYDE (President) in the Chair.

The Paper I have been asked to read to you this evening has for its object the consideration of prices of the various kinds of building and constructional work that obtained before the war, the prices of work during the war period, and the prices of work that will probably rule after the war is over. The first two phases can be dealt with from experience and facts, but the last is mere conjecture, and brings the imagination into full play—a very necessary qualification in computing prices.

In considering prices it is necessary to take into account every kind of work, both that of a purely engineering character, the various architectural and building works, repairs, maintenance, and decoration, the prices of all of which differ very largely and are arrived at by a variety of methods.

The main factors governing prices are, of course,

the cost of labour and the cost of materials. The cost of labour includes the necessary preparation of the materials, the adaptation for their respective positions, and the fixing and finishing in the work. In pricing the cost of the labour the estimator must have had long and varied experience, as, in considering the relative cost of labour and materials, which is roughly about half and half, the cost of the former will seriously affect the price of the item. The cost of the materials, whether raw materials, such as sand and ballast, or manufactured materials, such as bricks, cement, steel, &c., can be ascertained by obtaining quotations from the merchants or manufacturers supplying such goods, and it is the task of the estimator to apply those prices to the various items.

In the computation of prices based on the cost of labour and materials it is sometimes asked whether the prices are correct, or merely based on some precedent or average. An estimate or a valuation of any sort has been described as an approximation to the truth, and that approximation is most efficiently provided through experience. Many men have given up their entire lives to the compilation of prices, and very valuable data have been obtained ; but the conditions of modern life change so rapidly that prices have continuously and regularly to be revised. In my opinion the science of pricing—and it is undoubtedly a science—is yet in its infancy. There has been a common saying amongst surveyors ever since I can remember that prices can be “stretched.” I think that saying must have arisen from the varied and extraordinary prices that are often put down for work by contractors, and which surveyors have to make use of for building up other prices in settling the final accounts.

Compare the tenders submitted for any kind of work, great and small ; the variation in prices is considerable, showing the different views of the contractors competing for the work. I would undertake to say that if the various prices of the different tenders were compared in detail, the differences between them would be even more apparent than the differences in the amounts of the tenders, and not only that but the totals of each trade would differ largely. It cannot be argued that all these prices are correct, and some of them must, therefore, be wrong.

It can be readily understood that the rate of profit added might vary to some extent, and that the overhead charges are larger in some firms than others, but one would suppose that the prices would vary consistently to cover these contingencies. Office traditions, based on former costs, handed down from time to time, have no doubt something to do with this, but even these in the various offices must differ largely. The question of finance has also to be considered, and no doubt the work which has to be executed first is often priced high, and the finishings executed at a later date priced low, so as to facilitate the financing of the job. This method must be worked out most carefully on the average system, and will not necessarily apply in all cases.

The effect of good or bad office administration, and the efficient supervision of work at the site, must have a large influence on the prices for which work can be carried out, both with regard to the buying of materials and the cost of labour. If the materials are bought at the proper time and in the best markets no doubt large savings can be effected, and if a continuous and regular supply of materials is maintained at the job, in the first place, there is no waiting, and they can be handled and

dealt with immediately on delivery, while no wastage occurs by having to shift them about afterwards with always the chance of damage. The quickest and most economical means of carrying out work at the site is by making arrangements ahead, and seeing that a general scheme is arranged at the commencement for the conduct of the whole job, and, above all, by the proper and accurate execution of the work in the first place, so that it has not to be done all over again.

The introduction of machinery has largely affected the cost of production, not only in the manufacture of certain materials used for buildings, but also in the actual carrying out of the work at the site. Compare the old method of carrying up bricks and mortar in hods with the new hoisting apparatus in use, or the driving of piles by hand-operated monkey with the steam hammer. I think that many more labour-saving appliances will come into vogue unless the cost of building operations is considerably reduced, and when once the prejudice against these innovations has been overcome improvements and developments will rapidly follow. The methods adopted for many years with regard to scaffolding have not yet been altered, and although the tying together of scaffolding has been simplified, there remains much to be done in the way of reducing the cost of this item.

In addition to the prices of labour and materials employed in the works, there are also the statutory and temporary works necessary to comply with the various building regulations and requirements. The cost of these statutory and temporary works has to be separately allowed for or to be spread over the various items priced. Scaffolding, gantries, hoisting appliances, temporary roads, offices, the supply of water, sheds for

materials, and offices and sheds for the staff and workmen, not forgetting the necessary cooks and attendances for them, lighting, watching, fees to the various authorities, and a host of other contingencies, including the various insurances, have all to be taken into consideration and provided for. There is also the question of the general labourers, who do not appear to be working in connection with any particular trade, but to be generally clearing up and attending upon, cutting away for, and making good after everybody else, the cost of whose work cannot be very well allocated to any particular trade, but, in the aggregate, comes to a pretty large sum.

There is a large and variable allowance to be made for waste in all materials, including the increase in bulk of the earth excavated, especially if clay is met with, which has to be disposed of. In mentioning waste I do not only mean the waste arising in the preparation of the various materials, but also the actual decrease in bulk of certain materials in the process of mixing, particularly concrete.

Coming now to the various methods of obtaining prices for carrying out work, there are two generally adopted, the first by tender with or without competition, and the second by direct employment of labour and purchase of materials. The first method may be sub-divided into two heads: (1) The lump sum tender, and (2) a schedule upon which the work executed is measured and priced.

With regard to the method of obtaining prices by tender, the lump sum estimate is of assistance in arranging the finance for the intended work, although the variations that usually occur may seriously affect the total cost when the same are measured and valued;

the cost of these variations may, however, be closely approximated during the progress of the work, so that arrangements can be made from time to time to make the necessary adjustments with regard to finance. The principal benefit arising from this kind of tender is to enable people to cut their coat according to their cloth. Approximate estimates are all very well, but in many instances people require to know fairly closely what money they will be called upon to find, and if the tender received for the work is too high, or beyond the means of the building owner, modifications can be made to suit the requirements of the case before the work is commenced.

Where money is not of so much importance, or where work *has* to be carried out to meet legal requirements, or the exigencies of the public service, or where the work cannot be definitely determined upon at the outset, the schedule of prices is preferable. This method usually works out fairly well, provided the descriptions in the schedule of prices do not cover too many contingencies, and the prices for the various items can be properly estimated on given data, so that, if different circumstances arise, the prices can be modified accordingly.

With regard to the method of carrying out work by direct employment of labour and purchase of materials, the first objection to this is the fact that the contractor, who has made a lifelong study of this particular form of work, and who has all the incentive of profit for the exercise of individual effort and enterprise, is eliminated. The best means of purchasing and employing plant, both for the particular job and afterwards, the purchasing of materials in the most economical way, and making the most of efficient administration and superintendence and

employment of labour, will all fall on the shoulders of the amateur, and not the expert.

Of course where Government departments or large public corporations are concerned, who are continually carrying out work by these means, the case is somewhat different; but even here, although by constant use they may be able to purchase largely and upon favourable terms, the individual touch is wanting, and whether the workman will get through as much work in this way as for a contractor is questionable. This can be ascertained only by results, and if the costs are carefully kept, these can be proved to a certain extent, but not entirely, as the value of the work done is largely affected by the methods employed.

Work can generally be done in a variety of ways, and the materials used differ largely in quality and price. If the work actually executed is measured and valued, a reliable comparison could be made of the two methods; this would entail a great deal of labour and expense, but it is only by this means that a really reliable comparison can be made. So many points crop up during the execution of the work, and so many variations are made, in method and material, that it is only by actually ascertaining what amount of work has been carried out that a correct value can be placed upon it.

There is a third method of carrying work out on a profit basis, either a percentage on the cost, or a limited profit on the work. My firm have acted as quantity surveyors on only two fairly large jobs carried out in this particular method, but the overhead charges, mechanical and other plant for use on the work, and the profit were tendered for in competition, and an accurate estimate made of the cost of the work at the commencement. Reports were made from time to time of the cost of the

various alterations that occurred, also frequent careful comparisons were made of the actual cost of the work with the estimated cost, and I am bound to say that the result proved satisfactory.

Without expressing any opinion as to the wisdom of executing work in this way, the success, or otherwise, of the job would largely depend upon the integrity of the contractor for the work and whether he gave it his careful personal supervision.

The advantages of competitive work are an incentive to economy and a general tendency to efficiency both in employer and employed. Various expedients are tried and experiments made to reduce cost. A closer personal touch is maintained with the work by the contractor, and the cost in its different stages is more carefully followed. By this means not only can the actual cost of the work be carefully compared with the estimated cost, but reliable data be obtained for pricing future work.

Taking now the necessary qualifications of an efficient estimator or surveyor, to enable him to arrive at a great number of prices for all sorts and conditions of work, prices which he must build up entirely himself from acquired data, experience, and knowledge of cost for both materials and labour, I think it will be admitted that he must be a man of some attainments, with plenty of pluck to grapple with and overcome difficulties, avoid pitfalls, and not afraid of taking considerable risks and responsibility. The science of estimating must have been carefully studied for many years, and every opportunity taken for enlarging and improving his store of knowledge and data, not only from books, but from actual work.

In arriving at prices many considerations have to be

taken into account, owing to the varying character of the work to be priced and the number of materials employed.

In the first instance there is the work of the purely engineering type; secondly, the general building work, repairs, and maintenance; and, thirdly, decoration of a more or less elaborate type; so that one day the estimator may be called upon to price an estimate for a bridge, dock, pier, or railway; the next day a large block of offices or flats, a public building, a private house, or a church; and the third day the elaborate finishings of a large club, a luxurious hotel, or the delicate intricacies of a lady's boudoir. I believe that one facetious counsel described a surveyor as "a gentleman who could value anything from a deep sea shell to a planet." Whether or not he may be able to value either or both of these somewhat unusual commodities, if he be able to price all the estimates named (and there are many others), I think it must be admitted that he must have made the most of his time and experience.

It must not be supposed that all these various types of work are always estimated for by one man only, as a great deal of the work is highly specialised, but there are a great many estimators who are capable of and have to formulate prices for all these various works with the assistance of specialists. Although a great many prices apply about equally to most jobs, there are many others that most emphatically do not. A good estimator must be able to build up the price for nearly every item called for, both as regards labour and materials; but after obtaining the necessary quotations for the materials (if he can do so), the responsibility of estimating the cost of the labour generally falls entirely upon his shoulders.

In estimating for work, clear and concise particulars are required both in the way of drawings and specification, or of drawings, specification and bills of quantities. When drawings and a specification only are supplied, a great deal of energy is wasted by each competitor having to take out some kind of detail particulars in order to arrive at a price on the information given. If, however, bills of quantities are also supplied, that process is done away with, and only pricing is necessary. It is most essential to inspect carefully the drawings and to visit the site before sending in a tender, more especially when there are alterations to be carried out to existing buildings. The site and approaches have to be taken into consideration, and the method to be adopted of getting in materials and hoisting them to their required positions.

In all large contracts, particularly of the engineering type, the nature of the earth to be got out is a most important factor in arriving at a price, and, in most cases, the description of the excavation, whether taken from the specification, bills of quantities, or schedule of prices, has, like charity, to cover a multitude of sins.

Firstly, there is the cost of the actual digging out of the earth, and its disposal: then the planking and strutting, timbering, and occasionally dams, to be taken into consideration; lastly, and not least, is the question of water that may be met with. A free hand is usually given to the contractor to carry out the work in any way he may see fit, but he is invariably called upon to take all risks. Now to arrive at a price for such excavation, whether in earth, or under water, needs a thorough grip of the whole job, and usually necessitates devising a comprehensive scheme for carrying out the work as well as the designing and the cost of much expensive plant.

The question of depth, where mechanical means of hoisting can be applied, does not affect the cost of the actual digging to any great extent, although the planking, strutting and timbering is largely increased, and all risks enhanced.

To imagine a price that can be put for such work without long and intricate calculations is a fallacy, and the estimator for such work must have a certain amount of engineering knowledge, or have the assistance of an engineer in arriving at his figures. It will, of course, be readily understood that he who can quickly obtain a grasp of the whole job, and can conceive and design the most expeditious and efficient means of carrying out this kind of work while estimating, will generally obtain the contract.

This kind of engineering work is, of course, highly specialised, and the various data obtained from previous work are of the greatest assistance in arriving at prices. It must not be supposed, however, that one job will form a precedent for all others, and to imagine that, because one class of excavation in a particular locality can be executed at a certain price per yard cube, similar excavation can be carried out in another locality at the same price might prove to be utterly wrong, as the soil to be dealt with might be of quite a different character.

May I say a word with regard to the excavation in more ordinary building work, where deep basements have to be constructed, and where bills of quantities are supplied that purport to give the necessary planking and strutting and timbering in detail. To imagine that a large and deep excavation (except in rock or other stable material) can be got out in one single operation, and that timbering is only necessary round the extreme sides, is wrong. In one instance of large deep excava-

tion that I have come across, the excavation had first to be got out in trenches round the site, some of which trenches, on account of the construction of the retaining walls being ferro-concrete, had to be got out 60 feet wide and over and about 35 feet deep, the timbering of which cost more than the total cost of the excavation and carting away. On the other hand, I also know of a case where certain exact particulars were set forth in the bill of quantities of the width and depth of the trench to be got out round the site, and in arriving at the price for the timbering the contractor carefully based his price for same, not on the total depth, but on 1 foot only in depth.

The probability of finding sand or ballast suitable for use in the work has also to be taken into consideration, although this must be discounted to a certain extent, as water is frequently met with where either of these materials is found, and the finding of too much of either of these useful materials is not always an unmixed blessing.

Taking concrete as the next item in pricing, the difficulties here are not so great, as reliable prices can be obtained for the cost of the materials, and the estimator has only to form his own opinion as to the probable cost of the labour, which must largely be governed by the size of the concrete to be filled in, as, if concrete can be mixed in a mechanical mixer and shot direct into position, the cost of same is much less than if mixed in small quantities by hand and filled into ordinary trenches. The cost of shuttering is an important item in concrete above the ground, and if not given in detail some further calculations have to be made by the estimator.

The next item we come to is brickwork, again in-

volutioning the estimator only with regard to labour, as accurate prices can be obtained for the cost of the materials.

One item of brickwork I was once called upon to price was unique in my experience, the description was so many yards cube of "Brickwork in any position including facing glazed, or otherwise." The cost of a rod or yard cube of brickwork in a big embankment, or a thick wall finished with ordinary facing bricks, is somewhat different from the cost of a $4\frac{1}{2}$ " wall faced both sides with glazed bricks.

Taking stone as the next item to consider, here we get a material that has been worked under varying conditions from time immemorial. The advent of machinery largely affected the cost of working stone, and very careful records have been kept of the cost of this working, enabling the price to be put down to cover the cost of the stonework at per foot cube. The prices at which granite could be bought ready worked for fixing has always been a mystery to me, but perhaps the fact that some of the firms producing such granite work have disappeared may account for it.

With the advent of constructional steelwork and ferro-concrete a complete revolution was made in the structure of buildings, largely affecting the cost and complicating the design, but giving far more space for use in the building. The cost of labour on ferro-concrete work is no doubt high; not only has the steel reinforcement to be placed in exact position, but also to be kept there while the concrete is being filled in, and where concrete has to be filled into beams with reinforcement in the top as well as in the bottom the labour involved is most costly. Again, if I may say so, the design is so intricate, and the

strength so accurately calculated, that the work has to be most carefully and exactly executed, and men found and trained for this purpose. The ties and stirrups have also to be kept at their proper distances, and I believe that twenty ties or stirrups in a lump are not supposed to fulfil the duties of those designed to be placed at regular intervals. The cost of centering and molds for ferro-concrete work has to be very carefully worked out, especially where there are large spans and where much scaffolding is necessary. Experience gained in this class of work from the actual cost is, of course, of the greatest assistance to the estimator, but it is necessary to take the work in full detail, as the cost of the various kinds of centering differ enormously. The proper value of this ferro-concrete work has been fairly accurately ascertained, and the wide differences in prices that obtained in the early stages have to an extent disappeared.

Before leaving the question of the prices for excavation, concrete, brickwork and stonework, I would like to observe that there are no stereotyped prices for these classes of work; each has to be worked out on its respective merits for each class of job in each particular locality. Although approximate prices may be put down, the cost of materials and transport differs so largely in different localities that it is impossible to estimate closely without making full inquiries on the spot.

Taking the remaining trades to be priced here we get much more uniformity. The cost of materials does not differ largely in the various localities, and there are not nearly the risks to be run in the finishings (providing care is taken in selecting the materials and carrying out the work) that there are in the constructional part of

the work. The cost of transport is not nearly so serious, most of the materials being of no great weight.

In the formulating of some hundreds of prices that comprise a tender, the estimator must have a good general knowledge of the value of materials, as it is obviously impossible to get in quotations for everything required in the short time allowed for the preparation of tenders. He must also have the usual cost of labour at his fingers' tips. If estimators could spare the time, very valuable information can be obtained by comparing the costs of the various trades with the totals of the trades in the accounts, and if this is done regularly and continually closer estimates can be prepared, and if certain jobs do not pay, or pay a higher percentage than that estimated for, unless there are very special reasons for it, the causes can usually be discovered and rectified the next time.

The advent of the sub-contractor and specialist has, in one sense, made the task of the estimator easier, and in another more difficult, as, if a reasonable amount is put down for the use of scaffolding, plant, and appliances to be found by the contractor for the general conduct of the job, and for profit, he usually finds out that someone else is willing to cut these things a bit finer.

Latterly a good many tenders have contained work of two classes, that to be tendered for by the contractor, and that for which provisional sums are included to be paid out to sub-contractors and specialists, and as the total amounts for each class were sometimes about equal, the profit and attendances added to those provisional sums had a considerable influence on the amount of the tender. The practice of the subletting of certain trades or portions of trades to other contractors is of great assistance to the estimator, but I think that, before

taking their estimates as his own, he should carefully examine the prices, as well as exercise discretion in the choice of the estimates adopted. The time and money spent in obtaining these sub-estimates and quotations is prodigious, but I cannot see, under the complicated system of keen competition, that there is any other method of obtaining reliable information when one has to tender for work all over the country.

Having set forth the difficulties to be overcome, and the information to be obtained, we now come to the conditions prevailing under which work had, or will have, to be undertaken.

Considering, in the first place, *the prices of work obtaining before the war*, I think it must be generally admitted that competition was keen, and that the number of jobs placed in contractors' hands without competition were few and far between. The natural reaction following the boom in the building trades some fifteen years ago was felt acutely just before the war, and prices were cut very finely owing to the supply being greater than the demand. The accumulation of wealth necessitated finding some means for employment, and people not infrequently embarked upon schemes and businesses about which their knowledge and experience were limited, and they, therefore, had to rely almost entirely upon the advice given them by others without being able to verify it themselves or to assist in arriving at any general conclusions. Unless an estimator with a long and varied experience in pricing was employed, not perhaps having the necessary data upon which to base his prices in the office, the results were somewhat erratic, and work was not infrequently undertaken at cost, or even under, the competition among the specialists and sub-contractors being especially keen.

Of late years a great deal of time and attention has been paid to teaching the elementary and advanced stages of building construction, but I personally have not come across many, or any, young people who have been taught much of the science of estimating. A number of books have been published giving the prices of various work, but when all is said, the numerous prices it is possible to give are merely examples, and the data given have to be applied to the actual work tendered for.

After gaining all the information obtainable from all sources, the next thing to do is to be able to price an estimate on the information thus obtained. This, however, is only the beginning, for many estimates are priced, and but few contracts obtained. It is not sufficient for an estimator to be able to price a bill on hard-and-fast lines. He must keep in constant touch with the prices that are being quoted, and attempt to ascertain where and why other estimates differ from his own. Of course there is a point reached at which jobs are not worth taking ; but as the class of work asked for is constantly varying, and as the extreme cutters cannot manage to carry off all the cream of the work, some crumbs must fall at last to the fairly priced estimate. As time goes on even the most extreme of the cutters have to revise their prices, as contractors, and even limited liability companies, have a limit to their resources, and I suppose that even advertisement has its price.

Of course when any contracting firm is well established and is noted for good work, the competition for high-class work is not quite so keen, as such firms tendering usually know what the work is really worth, and price accordingly. The practice of pricing out items to the 1-16th of a penny really does not make any appre-

cial difference in the amount of the tender, and is very likely to lead to mistakes being made in the subsequent clerical work, especially when tenders have to be submitted at short notice. If the prices are arrived at on sound and consistent principles, a far more accurate estimate can be arrived at in the time given without going into such intricacies.

The cost of building was, like everything else, high, owing mainly to the largely increased commodities required in each building and to the more permanent and lasting, and, in some cases, extravagant, means that had to be adopted to meet the competition in the buildings erected, the latest up-to-date building erected being eclipsed by more up-to-date and elaborate buildings in a few years. Both labour and materials had been rising for a number of years, although the saving effected in the form of construction of the work might possibly partly cover the additional cost, although the cost of labour had not only risen considerably but the output had also been reduced. These matters, however, usually right themselves in time, as it is not to be supposed that buildings were erected unless there was some chance of their being a commercial success. Although the cost of building had increased, the rents for commercial buildings had increased in a greater proportion, the more up-to-date buildings commanding far higher rents than the older ones.

The next phase I now come to is *the prices of work during the war*.

When this stupendous conflict was first thrust upon us, the position was not apparently at first properly appreciated. "Business as usual" was attempted, presuming that we could carry on the war with one hand and conduct our business with the other. This extra-

ordinary state of things continued for about fifteen months, and the prices of materials during that time, with the exception of those used for the actual carrying on of the war, did not advance to any appreciable extent, and the cost of the labour for the time remained about the same. Soon, however, the enormous inroads made into the stocks of timber in the country, used in the construction of huts for the troops and other military purposes, came to be felt, and the cost of all materials that we had previously obtained from abroad advanced rapidly, owing to shortage and increased shipping freights. The cost of living advanced by leaps and bounds, and, of course, the rate of wages paid to workmen had to be correspondingly increased and war bonuses granted.

When all private work had eventually to be stopped, to allow the Government to carry out those enormous works which were necessary to produce the sinews of war, the prices of materials continuously advanced, and the output of labour, at least in the building trades, in a large number of cases steadily decreased. The practice of placing contracts on a percentage of profit basis did not tend to improve matters, and to meet the exigencies of the situation, most of the work *having* to be done in a very short time, a greater quantity of labour was employed than could be used advantageously. The condition of things soon became chaotic, quotations were given under all sorts of restrictions, and were subject to alteration without notice. Stocks were commandeered, and prices of all materials rose considerably and are still rising.

In spite of the tremendous increase in prices many and heavy losses were incurred on lump sum contracts, and a very large amount of the work now being carried out

is on a cost and profit basis, or, if on a lump sum, with contingent increases for rises in prices of labour and materials. What will eventually be done with pre-war contracts that extended into the war period and the contracts taken during the war period still remains to be seen, but the application of the principles underlying the Courts (Emergency Powers) Act of 1917 may, in some measure, assist in distributing the loss among the parties concerned.

I shall not attempt to deal with the prices during the war in detail, as no useful purpose would be achieved by doing so. We hope and trust they are only transitory, and will soon be buried in oblivion. It must not be overlooked, however, that the prices of materials home produced and the few that are imported are still going steadily up, and it is impossible to say how high prices will eventually reach, while advances are continually being made in the rates of wages.

I now come to the last phase of *the presumptive or speculative prices for work that will probably rule after the war is over*, which, of course, will be affected to a very large extent by the conditions under which peace is made.

Taking first the cost of labour, this must be governed by the cost of living, and although house rents have not advanced as yet to any appreciable extent, the cost of living, which seriously affects the pockets of wage-earners, will not, in my opinion, be reduced for some years to come, and I submit that only by the reduction in the cost of living can the wages of workmen be reasonably expected to be reduced.

If it is found possible to specialise in the various trades, so that each man can take up a particular job, or portion of a job, greater efficiency, and consequently

greater output, would be the result, and if each task could be arranged so that the workman or workmen employed could be paid by result on a uniform basis, more economical means might be found of executing the work.

The process of rate cutting by reducing the scale of payment would, of course, tend to slow down the output, but if proper rates, in the first place, are arranged on an equitable basis by the employers, in conjunction with the workmen, and workmen choose to exert themselves, the result ought to be satisfactory, the employers benefiting by the increased output, and the competent workmen would be enabled to earn far more with the general public benefiting to the largest extent.

There were certain specialised trades before the war, such as slating and tiling, wood-block floor, mosaic and other special floor coverings, gauged brick-cutting, fencing, certain forms of metal working, glazing, and many others, where men were employed always at the same thing, and thus became far more expert, where the prices at which these particular works were executed could not be done by ordinary tradesmen. Surely if the work is done, and done properly, and a proper living wage is to be earned, the cheaper the work is done the better for all.

If some sort of a scale of wages were arranged for output, which was not immediately varied directly the employers considered the workmen were earning too much, or varied to suit the requirements of those people whose one idea appears to be to do as little as possible, not only would the cost be in time reduced, but estimates could be much more closely and accurately priced.

As occasion arose the rates could be revised to suit the particular localities by mutual agreement, and I feel convinced that, in this way, the cost of many materials

could be reduced, and a great many savings be effected in the course of working and fixing the materials at the site.

Considering the extensive schemes that are being launched for industrial housing and the cost of same, unless the State is going to bear a serious loss, the rents of these new houses will have to be considerably higher than the rents paid for similar houses before the war, and this again will tend to raise wages, or, at any rate, keep them at a high level. However, taking all these things into consideration, the increased output which ought to result from better wages, shorter hours, and better conditions of living may, when the excitement and unrest caused by the war has calmed down, result in the lowering of the cost of work considerably. Whether this happy result will follow or not has to be proved, but the enormous convulsion caused by this war may have startling results, especially when the boys of all sorts and conditions who have been so gallantly fighting and unselfishly giving their lives for their kin and country return to us again. These great social questions do not come within the scope of this Paper, but they are bound to have a far-reaching effect on the prices at which buildings will be erected after the war.

The price of labour will naturally largely affect the cost of materials, and if the labour problem in the production of materials can be entirely solved by payment by results, the cost of materials ought to come down in a reasonable time to something approximating to pre-war rates. The governing factor in all things, however, has been, and always will be, supply and demand, and considering the enormous arrears of work that will have to be taken in hand when the war is over, it is not to be supposed that prices will come down when there is much

work about. The amount of war work now being carried out by the Government, except no doubt the new ship-yards extensions, we hope will be promptly closed down, and resumed, if found to be necessary, at some future and more auspicious occasion, thus releasing a large number of men, who, as they are discharged, can be taken on for the more urgent semi-public work, such as repairs to railways, roads, &c., housing, and the reinstatement of buildings temporarily occupied by the military and the Government departments. When tenders are again submitted, for some time at least, estimating will be more or less of a gamble until some new and reliable data can be obtained upon which to base the cost of work, and it is not to be supposed that contractors will take all risks unless they are properly covered by prices or insurances.

The same difficulties in pricing that existed before the war will still exist after the war, with the additional difficulties of finance, which will most probably tend to keep prices up. The cost of materials in this country, with the exception of essentially war materials, ought to come down to some extent quickly, but with regard to the cost of materials that have to be imported from abroad, the matter is far more complicated. Freightage will continue to be high for some time, but the rate of shipping insurance will be largely reduced directly the war is over, a fact which must at once exercise a considerable effect on the price of imported materials.

The first duty of shipping must, of course, be the supply of foodstuffs, and considering the position of this country with regard to the home supply of food, a very considerable amount of shipping will be necessary to replenish our depleted larders. There is also the very large amount of shipping that will be required for the

transport of men and materials from the war areas, not only to this country but also to America and the Colonies.

To obtain and import timber will be one of the chief difficulties, as the various sources of supply have been largely depleted and dislocated and will take some time to get into working order again, and although it has been found possible largely to do away with the use of timber in construction, yet a certain amount must of necessity be used in every building. The question of being able to obtain timber in any quantity after the war will largely depend upon the length of time the war lasts. A large amount of home-grown timber has been made use of lately in our war buildings for carcasing work, but usually it has been quite unseasoned, and although the scantlings have been cut down to the smallest sizes, it remains to be seen whether it will prove efficient or not.

Setting aside the amount of work to be done in this country, where the damage thus far caused has not been very extensive, there is the very serious problem of rebuilding those regions that have been utterly devastated on the fields of battle, and surely this work ought to take preference over everything else, considering that up to the present those regions unfortunately lie mostly within the borders of our Allies or quondam Allies.

After the calls of nature with regard to food have been met, the housing of the population of the devastated regions must be attended to, and although the numerous temporary buildings erected all over the battle area will be of inestimable value in housing the workmen engaged upon the work of reconstruction, they are hardly suitable for domestic purposes, and, in any event, the majority are of quite a temporary character and would be very

costly to maintain, even if that were possible for more than a few years.

The task of reinstating these devastated areas can be effected either by the inhabitants or by the inhabitants with the willing assistance of their Allies, or by the forced assistance of their enemies, or possibly by the united efforts of all parties. I do not think that the fact should be overlooked that in all probability we shall be called upon to supply labour and materials for housing of the people, and at least a portion of the materials for the reinstatement of the factories and business premises in those areas.

A large proportion of the buildings constructed during the war (excepting those erected for the manufacture of arms and munitions, and even some of those, where time was essential, strange and unusual methods and materials have been adopted) are of a more or less temporary character, and will not be of any permanent use. The numerous factories and additions to existing factories and buildings of that description (erected of a more substantial kind) ought to be capable of being adapted for the production of peace commodities, so that in some measure the call for that particular class of building, which we hope will be in great demand, ought not to be so pressing, unless (after our late experiences) we proceed to at once prepare for the next great war.

For the first nine to twelve months after the war the question of labour will still be acute until a large number of soldiers have returned and settled down to civil life, and during that time building operations will be as difficult, or almost as difficult as during the war, so that during that period the cost of building will, in my opinion, remain at about the level of that at the end of

the war, even supposing that the Government do not place an embargo on all luxury buildings for some time in order to push forward their numerous housing and other schemes, which, I think, is more than probable. After then, however, when things have more or less resumed their natural courses the cost of building should be reduced.

The cost of materials produced in this country has not advanced in the same proportion as the cost of materials we have had to import, so that when ordinary buildings are again erected, in a reasonable time the cost of same ought, and to a considerable extent quickly, to come down from "the during the war prices."

Coming now to the principal question of what the prices after the war are likely to be, if we take the pre-war rate of building at x , the consequent increased rate after the war will naturally be y . Much has been said and many conjectures made as to what y will be; one thing, I think, is generally admitted, that y will be a plus and not a minus quantity.

Wages, taking into account war bonuses, have already risen about 50 per cent., and materials anything from 50 to 500 per cent. It must not be overlooked, however, that the great bulk of the work has been carried on all over the country, and at great stress. Places have been selected for building operations in most inaccessible spots, and the difficulties in housing the workmen were frequently solved by building temporary hutting accommodation, or bringing men in from the surrounding districts by train or other means of quick transit, and railway communications had to be formed. These obstacles have naturally raised the cost of the work, as all the workmen's special expenses had to be paid and an allowance made for the extra expenses they

were put to in living away from home. These conditions, however, should rapidly alter when we return to more normal times, and although the rate of wages (exclusive of the purely war bonuses) will take some time to be reduced—if it is ever reduced—yet the total cost of the work may not be very greatly increased thereby if a little more latitude is allowed in the construction of buildings and some system of co-operation adopted between masters and men.

Passing over the period of the first nine to twelve months after the war, by which time we may expect to have returned to something like normal times, we shall also return, we hope, to ordinary building conditions.

Separating the constructional work and the finishings of a building, which in ordinary buildings, excluding factories, can be taken as roughly about half-and-half, the constructional work is largely made up of materials, while the finishings take a greater percentage of labour.

Taking the constructional part first, the cost of materials manufactured in this country will, in my opinion, soon return to about the pre-war cost, that is, to say within about 15 per cent. with the exception of constructional steelwork, of which very large quantities will be required for shipbuilding; ferro-concrete ships will have to be proved, and I understand there are many serious objections to their use. However, the enormous increase of plant for producing steel all over the world may very shortly reduce the price considerably. If different methods are adopted of dealing with labour on the job, here again, I think, the cost of output will not be more than 20 per cent. to 25 per cent. additional, so that the cost of the constructional work ought not to exceed 18 per cent. over pre-war prices.

The finishings, however, stand on a different footing,

especially with regard to timber. The cost of finishings will, in my opinion, be increased at least 35 per cent., so that, taking ordinary buildings, the extra cost will be about 27 per cent., and factories and buildings, when the finishings are of small moment, about 22 per cent. above pre-war prices.

In arriving at these figures I am, of course, assuming that normal conditions obtain, and that the Army and Navy have been reduced to reasonable proportions, and that the work of re-housing in the war-devastated areas has been well started, so that the people of those areas are able to grapple with the remaining problems themselves. How long this will take, and how much assistance we shall be called upon to render, entirely depends upon how much longer the war lasts, and how much more damage is caused, and what further districts become involved. Taking a reasonable view, as far as any view can be called reasonable, twelve to eighteen months ought to be sufficient in which to render the necessary assistance to our Allies before we can turn our attention entirely to our own wants, although after about nine to twelve months, as already stated, a large number of men ought to be available for building work at home.

The question of the prices of all materials will largely depend upon the amount of materials we shall be called upon to supply to other countries, as during the time the competition between the home and foreign markets exists there will not be very much likelihood of prices returning to the normal, nor is it at all probable that we shall be able to obtain many building materials from abroad for some time. The arrears of building operations and repairs in this country will be so large that for at least another ten years after we have returned

to normal conditions there will be no prospect of reduction in cost through supply exceeding demand.

Housing schemes for the working classes, and, above all, convalescent and permanent homes for wounded and disabled soldiers and sailors, will have to be taken in hand at once, and ought to provide plenty of work for those now engaged on solely war buildings as and when they are discharged, so that the men are not out of employment whether the war is finished or not.

The control by Government of certain industries and trades after this period ought to be ended, as by that time they ought not to be the largest buyers in the market.

I have not considered the question of strikes in the building trades, as I hope after all we have been through some better method will be found of solving labour problems than the suicidal methods adopted during the last fifty or sixty years whereby a large portion of trade has been lost to this country.

Before concluding this Paper I think one matter ought to be considered, and that is the placing of contracts after the war. For the first few years great difficulties will be experienced in estimating owing to the unknown cost of labour and the varying prices of materials, and the fairest and most economical method will be for work to be placed at cost with a fixed profit, and the necessary precautions taken to check same so as to arrange for finance. In this way it will be possible to compile prices that will meet the new conditions and so enable contractors to submit close and firm estimates.

As soon as building operations can be accurately tendered for and placed in the hands of contractors so soon will the cost of buildings be brought down, as from

their experience they should be able to carry out the work in the most expeditious and economical manner. The incentive of turnover and profit will always bring out the greatest energy and initiative of the individual, and if this great war produces a better and more human element between employers and employés, resulting in unremitting application, hard work, and enterprise all round, enabling us to hold our own and resume our old position of supremacy during the difficult period of reconstruction after the war, it will not have been fought in vain.

Mr. G. CORDEROY (Member of Council) moved that the thanks of The Institution be presented to their visitor Mr. Selby for the valuable and suggestive Paper to which they had listened with so much interest and pleasure. The Members were fortunate in having the discussion of the subject opened for them by a man of wide experience and recognised authority on the various matters with which he had dealt.

In his opening remarks upon the practice of estimating and the qualifications of the estimator, Mr. Selby had said one or two things upon which he (the speaker) would like to comment. The author of the Paper rightly described an estimate as "an approximation to the truth," and then proceeded to refer to pricing as a science. It was quite true, in a very broad sense, that, like all forms of knowledge, pricing might be described as a science, but it could never be what was popularly called an exact science; the estimator must always be dependent ultimately upon the application of his experience and judgment, and the envisaging by means of a trained imagination of the circumstances

surrounding the execution of the project that was the subject of estimate. Further, the conditions as to time in which estimates had frequently to be prepared made it impossible to construct schedules applicable to every item of work set out and described, and necessitated broad estimating for a large proportion of the work, and the use of customary, or what he preferred to term "token," rates for a large proportion of the work. These "token" rates must, of course, bear a proper relation to one another, but would have to be adjusted to the particular work by a percentage addition or deduction. These rates were the product of what was referred to in the Paper as "office traditions." The settlement of the percentage was the real process of estimating, and was the result of experience.

Then there was another very important matter to which reference had been made, and that was the question of waste. Here, if he might venture to say so, the definition struck him as being somewhat loose. The illustration given was really not one of waste, but a shrinkage due to the manufacture of the building materials used in the work. Unavoidable waste was due only to conversion; avoidable waste to careless ordering, careless handling, and the spoiling of material by faulty storage. Waste of labour was due to faulty organisation and the setting of impossible and therefore disheartening tasks. That was a source of waste very often overlooked by employers and others of small experience, but it was a very fruitful source of waste in execution. A big contractor of his acquaintance had told him that his chief occupation in connection with his work was to check and control waste. Of course, in his estimate, the estimator was entitled to assume that his work would be properly carried out, and that avoid-

able waste would be prevented, and that there would be economy in administration. He was inclined to think that the sources of failure in connection with works were more largely due to waste than is generally realised.

There was another point in which they were greatly interested, and that was the comparative merits of lump sum, schedule, and prime cost contracts. He was, as a surveyor, perhaps tempted to digress upon this very fruitful subject, and to express the opinion that when the conditions of execution were precisely known, and the nature of the work to be done and the methods of construction determined, then a lump sum contract was best for all parties. But when there was uncertainty under these heads, particularly in regard to foundation work, or work to be carried out under water, then the schedule contract was the best form of contract, as the hypothesis of variation of the typical work shown in the contract particulars was its essence.

As the reader of the Paper had pointed out, in what was known as the prime cost contract there was no incentive to those concerned to practise economy, and the employer or the building owner was entirely dependent in that respect upon the personal idiosyncrasy of the contractor or of the man in charge.

He was glad to hear such sound views expressed in that room on the subject of competition and the letting of contracts, and to find that Mr. Selby's was not the only voice in support of contracting being carried out on right principles in the future by public authorities. He hoped good results would follow. An ideal arrangement in his (the speaker's) judgment in regard to such contracts was that the architect or engineer should concern himself with the preparation of the design and supervision

of the finished work, that the surveyor should prepare all documents for the purpose of obtaining the tender, and that the contractor should be left a free hand as to the best means and methods of carrying out the work with a profit to himself. Under such an arrangement the combined energies of three separate orders of mind would be employed in producing the best designed, the best constructed, and the most economically executed work.

In considering the cost of building before the war, Mr. Selby had rightly led off with primary governing factors, and had drawn attention to the glaring way in which they had been disregarded in the placing of contracts during the war period, which was known to many of them. Much of the cost to which the country had been put was due to the amateur handling of contract matters by persons without previous experience of the particular class of business for which they were entering into contracts and inviting tenders. He agreed that it was very little use to discuss the prices which had prevailed during the war period, because it was not likely, at least he profoundly hoped that it was unlikely, that business would be continued under the really chaotic conditions which existed at the present time. The great bulk of those conditions was of course due to the artificial isolation in which they now lived, but some of those conditions were directly traceable to the inexperience of those dealing with the large mass of business, and the failure to employ professional experts, whether as designers or as constructors of the work, who had made that business the study of their lives. During the years 1913 and 1914 prices were abnormally high owing to the fear of labour disturbances and to the great rises in the prices of materials to

which reference had been made. There were good judges who thought that if war had not intervened there would have been certain modifications in prices all round owing to the inflation which had undoubtedly taken place in the values of materials and to the inefficiency which had overtaken labour.

In instituting his comparison between the pre-war period and the post-war period, Mr. Selby had taken a time of 12 months after the conclusion of peace, which he (the speaker) thought was a reasonable estimate of the probabilities, judging by the estimates put forward by responsible authorities for the period required for demobilisation. He was inclined, generally speaking, having given much consideration to the subject, to endorse the conclusions at which Mr. Selby had arrived, but he would have fixed the comparative increase somewhat higher than the author had done in his Paper. He was aware that there was a very great difference of opinion on that point among persons who were recognised authorities. Some of the difference arose, he thought, owing to the same period of time for comparison not being taken. A very important feature in making these calculations was to estimate the length of time they would require to return to civil conditions, but on the whole he considered that the higher estimates which are about were not altogether warranted by probability. It was a very curious fact that the rate of increase suggested by the author of the Paper was practically the same as the rate of increase in the value of money, and that fact rather tended to corroborate the justness of his view. He agreed that one of the factors making for a reduction in prices would be the increase in the productive capacity of the country. There was no doubt that the war had greatly quickened the pro-

ductive capacity of all countries—perhaps pre-eminently of this country. If they compared the output of goods now with the output before the war, and reflected upon the fact that we have over five millions withdrawn from industry, they obtained a marvellous comparison.

Then, again, the stimulus given to inventive and administrative ability in the direction of the invention and production of labour-saving machinery would be very great. As an example, he might refer to the big engineering contracts which had been very successfully performed in recent years, in which there had been a great increase in the size of concrete blocks used; the progressive improvement in lifting machinery, and the increase in weight of the concrete blocks handled, went hand in hand with resultant economy in work. The introduction of lifting machinery in the outside work of *building* had as yet, however, hardly commenced. He entirely endorsed the opinion that a great deal more might be done in the simplification of the very important item of scaffolding. He had yet to learn that the principle of the inclined plane was used to any extent in this country, and they had practically stuck to the old-fashioned ladder. On the burning question of the influence of labour on cost, he was one of those who hoped the workman would abandon his pernicious theory as to limitation of output and the wages fund, and also that the employer would abandon his practice of cutting the rates. He thought the whole course of our future success was summed up in those two questions. He did not think we had anything to fear from the bugbear of over-production. There was an enormous demand for building which could only be met by cheapened construction, but as soon as the cost of construction was brought down to a reasonable level the demand

would certainly grow, and they should be in a position to meet it.

He had great pleasure in moving the vote of thanks to Mr. Selby.

Mr. F. H. A. HARDCASTLE (Fellow) said that he seconded the vote of thanks with great pleasure which had been proposed in such happy terms by his friend Mr. Corderoy. It was a pleasure to hear the Paper from Mr. Selby, who from his unrivalled experience had given them an exposition of the art and science of estimating with such lucidity, thoroughness and soundness as had never before been heard in those walls.

It would be invidious to go over the ground which had been so admirably traversed by Mr. Corderoy, but he would deal with one or two other points that were raised in the Paper. He was glad to see that Mr. Selby had a word to say about the scanty means there were for young men to learn anything about pricing. For a good many years he had acted as examiner in subjects connected with building, and candidates used to come up for a paper in knowledge of prices. It was always the worst worked paper of all, and when one came to think of it young men had very poor opportunities of learning much about prices. The principal always priced the bills himself—that was his experience—and a man must have great diligence and zeal to pick up any knowledge of prices. Price-books had been referred to by Mr. Selby, and he dismissed the point in one sentence. It was a curious thing how one was always struck with the air of unreality about price-books. If in an argument about a price anyone quoted from a price-book, the remark was always received with a

smile. Now there were a good many price-books, and when looking over some in the Library he had noticed that they did not speak well of each other. There was the book by Mr. Rea on *How to Estimate*, in which the author remarked that price-books "are naturally" "the first resort of the inexperienced estimator, but, as" "a matter of fact, the trade does not rely on them for" "serious pricing." That was not encouraging for any man who went to those books for instruction. Then there was a book by Mr. George Stephenson on *Estimating*, and that author made this remark at the very beginning: "Price-books are delusive as an aid" "to competition." What could be done? It was rather hard to say. There were only two suggestions he could make on that; one was that the compilers of price-books should push still further the separation of prices into two parts, the value of the labour and the value of the material; and his second suggestion was that teachers should be engaged from among men who were really employed in pricing work.

He passed from that to another point which he was very glad to hear Mr. Selby deal with, *i.e.*, the short time which was often allowed for the preparation of estimates. Here he thought Mr. Selby had put his finger upon what almost amounted to a scandal. Indeed, in thinking about the development of building enterprise it struck him that they had an illustration of what was known in mechanics as accelerated velocity. First they had the leisurely and dignified operations of the solicitors in the purchase and conveyance of the land. That done, the architect was engaged and received his client's instructions as to his requirements and the amount he proposed to spend on the work. Having prepared his preliminary sketches, the architect then had

repeated conferences with his client, and speedily found out that he had to do two things; first to convince his client that he could not have thirty shillings for a sovereign, and then he had to educate him in the meaning of a plan. All this took time. The discussion and revision of the sketch drawings took more time, and when that was finished and the scheme approved, then came the pressure. Time became of the greatest importance; the architect must put on all strength, he and his assistants must work late and must get out the working drawings. Then more pressure was exercised. The drawings and, possibly, the specification were handed over to the surveyor, who was urged to do his part of the work in the shortest possible time, and usually received sharp messages as to the unconscionable time which that simple operation appeared to take. Then the bills were handed to the contractor for his estimate, and he was given perhaps five or six days in which to prepare his tender, for which a fortnight would not be too much. There, he thought, they got the source of a great deal of inaccurate and loose tendering, and to his mind it often led to future trouble. He did not suppose that anything he might say would have any great effect, but if they, as surveyors, could sometimes convince building owners that this system was contrary to their own interest as well as unjust to the contractor, they would be doing a good thing.

Apologising for speaking so long, Mr. Hardcastle said he felt bound to say a word on the question of the probable prices after the war. He thought it was perfectly certain that if the standard of living was to be raised or even maintained amongst the working classes, what Mr. Corderoy had said was absolutely sound and true, production must be considerably increased. He

had read a book not long ago, by Mr. H. B. Gray and Mr. D. Turner, from which he learnt that in America the extent of the output by the increased use of machinery had doubled the production per head of the wage-earner in that country; where, moreover, it was from two to three times as great per head as with us. The horse-power of machinery there was in some trades 60 per cent. more in proportion to the number of operatives than in Great Britain. Now if that was true generally it was to some extent true of the building trade, and it was evident that some means of that kind must be applied if they were to hold their own in the future. With regard to the probable cost of building after the war, he was not able to take such a sanguine view as that expressed by Mr. Selby. There would be great trouble in lowering wages, and there would also be tremendous competition for materials. He sincerely hoped, however, that Mr. Selby's view might turn out to be right, and his own wrong.

Mr. ALAN PAULL (Fellow) said it gave him great pleasure to add his small quota of thanks to Mr. Selby for the admirable Paper he had read. The part of it which most fascinated him was that under the heading of his denominator y , *i.e.*, the cost of building after the war was over. That was a very intensive subject, and one on which they ought to bring their knowledge to bear as far as they possibly could. Several matters had been mentioned in connection with it—the question of wages and the question of work—but he did not see very much reference in the Paper to the question of finance. That was touched upon very lightly indeed, but in his opinion the question of finance was one which would have a great bearing on the future course of their contracts

and their work generally, because they had come to a time when the Government found that to obtain money they had to pay at least 5 per cent.; that meant that the ordinary financier would require more than that return on his money in financing any big business scheme. But of course that was a matter which would not add, they might say, appreciably to the cost of the work as a whole.

The chief things to his mind which would bear on the cost of work were the wages and the work that the workmen would turn out. They seemed to have come at the present time to a very vicious circle. They had seen prices going up, and wages increasing, and then to meet those prices and the higher price of living wages were being raised again. Now they were in the midst of another agitation for a further increase of wages owing to the further increased cost of living and so on. That was one point to be borne in mind when estimating the cost of work after the war, and he thought something should be done to break this vicious circle, and so cheapen the cost of production as far as the work was concerned.

Another point which was admirably put by Mr. Corderoy was that they had to train our workmen or get them to understand that the want of production, or the lessening of production, meant an increased cost to whatever work they had to put their hands. If they could get them to see how sound the policy was of putting forth their best efforts to produce everything as rapidly as possible, then he agreed with Mr. Selby that the cost of materials necessary for buildings, and the cost of building as a whole, would gradually come down. Personally he agreed with the estimate Mr. Selby had mentioned in his Paper as to the probable cost after

the war. He had kept rather a keen look-out, and he thought the percentages the author had mentioned would be justified when the time came, and also that it was likely to be eighteen months or two years before they settled down to the ordinary routine of the new work.

He trusted that as a result of the Paper which they had enjoyed that evening—from one who unfortunately was not a Member of The Institution—Members would have their attention directed to these problems, and he desired to express his thanks to Mr. Selby for the great care and thought that he had put into his subject, and in giving them something to which they would be able to refer with great appreciation.

Mr. A. E. BAYLIS (Fellow) said there was one point in regard to the prices of materials which neither Mr. Selby nor any other speaker had mentioned which would affect the question of building costs after the war—and also, of course, be based on the terms of peace—and that was the settling of the rate of exchange between this and other countries exporting building material, particularly timber. At a comparatively early stage of the war the cost of timber was increased by something like £5 per standard owing to the difference in the rate of exchange as between this country and Norway, while at the present time some £8 to £10 per standard of the price of imported timber was due to the rate of exchange being against us. Until something approaching parity is restored to the exchange rate, this factor would have considerable effect on the prices of such materials.

The question of machinery had been mentioned several times as though machinery was almost as much a factor in increasing building production as it was in

general manufacturing trades. He was afraid when Mr. Harcastle commenced to speak about America that he was going to suggest that the same figures would apply to the building trade, but he did finally point out that the percentage of the machinery was for industry as a whole. But with regard to the building trade they did not get repetition to the same extent, they did not turn out a number of things of the same pattern as was done in other trades, and they must not think for a moment that it was possible to get the same *per capita* increase of production in the building trade as, *e.g.*, in the metal trades, where repetition work was quite a common experience and a thing that could be carried out almost to infinity. Mr. Selby in one part of his Paper referred to men specialising in a particular class of work, but it seemed to him that if they started that in the building trade they would be very quickly up against the point when the specialisation of a mechanic to that extent would be more than counterbalanced by the waste of time due to the mechanic having to walk from one part of a building to another. It was one thing to specialise on a limited operation for which a man could stay in one place, and quite another thing to do it where every moment a man had to spend walking from one place to another involved so much waste of time. Considerable economies could, and no doubt would, be effected by the use of machinery and by standardisation and specialisation in the manufacture and preparation of materials and in work in the shops, but one could not expect a similar increase of output for the work carried out on the building itself.

The question of the provision in lump sum contracts for rises in the prices of materials had been mooted. He supposed that the majority of the Members of The

Institution on the building side were aware that in Scotland the new conditions of contract provided for adjustments to meet market fluctuations in respect of excess quantities of materials beyond those provided in the original bills of quantities. This, of course, arose from the state of the markets to which Mr. Corderoy had referred. On the rapid rises in 1913 and 1914 the contractors in Scotland practically went on strike, and although they did not get all they wanted or anything approaching what they wanted, there was a provision, and, in his opinion, a justifiable provision, by which an alteration in the market prices of materials could be provided for in extra work on the contract, leaving the contractor to cover himself only for the materials in his quantities. Whether they would be quite as pleased to have that clause working against them on falling markets after the war was perhaps another matter. He presumed contractors south of the Tweed would probably be requiring the same treatment in the near future. He thought that competition after the war would not be so keen as some people imagined. Small builders might have been crushed out by war conditions. Some big contractors have been doing fairly well during the war, but he thought the small good-class of builder, the man who could take a medium-sized job, had in a great many cases gone to the wall during the long period of prohibition, uncertainty, and high prices.

He quite agreed with Mr. Hardcastle in regard to price-books, which, while they had their uses and were very valuable for reference, were yet somewhat dangerous things to put into the hands of an inexperienced person, as they could, of necessity, only deal with prices in a very broad and general way. He was rather inclined to

agree with Mr. Selby's estimate of the position after the war. The prices of materials did seem abnormally high at the present time, but one had to remember that the increase did not reflect itself directly in anything like the same ratio in the total cost of building. But one thing that would have to be done after the war, and in fact had to be done very much now, would be to go back to first principles in making estimates. It would be necessary not only to arrive at fresh basis prices, but to discard also the old "follow on" additions to and deductions from them, and to revise all in the light of new factors of labour and material values. Many of the old "follow on" additions now became deductions, and *vice versa*. He was speaking of such things as, *e.g.*, the prices of doors with open panels, &c., which, with timber at present rates, differed materially from the old conception of their relation to the basis price.

He was sorry not to have been able to make his comments more precise, but this was due to his not having read the Paper until that day, but he joined with previous speakers in expressing his thanks to Mr. Selby for attempting a prophecy as to what was coming to the building trade after the war. He was glad to think they were not all too pessimistic in regard to that. He thought there was a good future for the building trade after the war, but it would be for every man to put his brains into it.

Mr. R. B. MANN (Fellow) remarked that there were several matters in the Paper with which he felt tempted to deal, but he would refrain in view of the lateness of the hour. He would, however, take the opportunity of associating himself with the acknowledgments and

thanks to Mr. Selby for his able and interesting Paper. The one point, however, which he would like to hear a little more about, occurred in the last paragraph but one of the Paper, *i.e.*: "For the first few years great difficulties will be experienced in estimating owing to the unknown cost of labour and the varying prices of materials, and the fairest and most economical method will be for work to be placed at cost with a fixed profit, and the necessary precautions taken to check same so as to arrange for finance." He imagined that the methods Mr. Selby proposed would be those described in the early part of the Paper, but the author did not quite say so. Considering the very wide interest that the Paper would command, he ventured to suggest that it would be desirable to make this a little more clear, and that his conclusions in regard to the placing of contracts after the war were based upon his own experience as set out. This was the only point at the moment that he would raise.

The PRESIDENT, in putting the vote of thanks, which was agreed to with acclamation, said that he supposed the rating surveyor, although he had to inspect a large number of buildings, did not go into them with the same amount of detail as the quantity surveyor. He might say a great deal as to the extraordinary level to which the cost of buildings and machinery had gone, but he certainly would not venture to prophesy what was going to happen after the war, or as to when the war was coming to an end. He invited Mr. Selby to reply generally that evening, and to put into writing his detailed answers to the points raised in the course of the discussion for publication in the *Transactions*.

Mr. ERNEST H. SELBY, replying, expressed his appreciation of the manner in which Mr. Corderoy and the Members of The Institution had received his Paper, and his pleasure in being present as a visitor and seeing so many friends. He thanked the Members for their indulgent reception, and was glad to think they acquiesced in his views. He had spent a considerable amount of time over the Paper, and assured them he had given much care to its preparation.

There were one or two things he wished to mention. First of all, with regard to the title: it was rather an exposition of the way a tender is made up. He thought that a great many surveyors were not always estimators. He had had a good deal of experience in estimating, and he thought that it might be of some interest to the Members of The Institution to explain how estimates were prepared. It was really a very complicated business, and he went into it in order to show how the prices were made up. That would apply equally after the war, so that the difficulties which would then occur would be very large indeed, because, as Mr. Baylis had mentioned, the old basis of prices would then all be swept away, and they would have to start *de novo*. Not only would this be the case with regard to materials for which quotations could be obtained, but especially to the basic prices for labour, and it would be impossible to say whether they were right or wrong until they had been proved.

With regard to Mr. Corderoy's observations, he agreed that pricing was not an exact science, and under existing conditions never could be. The question of waste was of the greatest importance, both the unavoidable and the avoidable, but the avoidable waste could

be obviated only by close personal attention. That waste would apply equally to labour and materials.

The schedule of prices for heavy work was often difficult to price owing to the descriptions covering so many risks, especially with regard to the excavations. The amounts to cover the various risks had to be spread over the prices for the excavation to which they referred, and if different circumstances arose causing variations, the various amounts included might, or might not, be sufficient. The work would be made easier to price if fuller particulars were given of the timbering, &c., required, which could be priced, and closer estimates could be given. Undoubtedly the most important factor in formulating prices was output, and until some means could be discovered of *not* limiting output, so long would prices continue to be high.

He was glad to hear Mr. Hardeastle's remarks on the unwisdom of requiring tenders from contractors in an unreasonably short time. It was an irrational practice. In point of fact, unless proper time was allowed they did not get a real estimate at all—one, that is to say, based upon a due consideration of all the conditions involved, local and other. One consequence was that trouble which might have been avoided often occurred later on.

With regard to the teaching of prices to beginners, the only thing they had to study was the method of arriving at prices in detail, so as to be able to build up prices themselves. They ought to dissect the prices that came before their notice, and endeavour to arrive at the basis on which they were built up. Only the rudiments of prices could be obtained in that way, and the prices for the actual work asked for could only be accurately computed after experience had been gained from ascertained facts.

Referring to the question of finance mentioned by Mr. Alan Paull, he did not think this would affect prices at which work could be carried out to any large extent, but would principally affect the amount of speculative building, where money would have to be borrowed to pay for the work executed. In regard to contracts which had been taken lately, the question of labour was very difficult, as many of them knew. It was no good trying to estimate for it. In brickwork the cost was from £16 or £17 per rod, and even up to £20; in some instances bricklayers were receiving a bonus on all bricks they laid over 250 a day. It could not be surprising that with these conditions it was quite impossible to make any basis of estimates.

He did not agree with the remarks of Mr. Baylis that machinery was only suitable for a factory. He thought that if the cost of wages went up, and the output went down, they would find that a great deal of ingenuity would be exercised in inventing machinery to take the place of labour, and, when once started, developments and improvements would be sure to follow, and prejudice about the use of labour-saving appliances would have to go.

In reply to the question raised by Mr. Mann, he certainly intended to refer to the precautions mentioned on page 193, for work being carried out on a profit basis. Unless there was some record or check upon what the work ought to cost, there was no means of ascertaining whether the work had been carried out advantageously or not.

He thanked them for the courtesy with which the Members of The Institution had received a stranger, and for the reception accorded to his Paper.

THE METRIC SYSTEM IN ITS RELATION TO THE SURVEYORS' PROFESSION.

BY LIEUT. A. J. MARTIN (FELLOW).

*Read at the Ordinary General Meeting of THE SURVEYORS'
INSTITUTION, held on Monday, 6th May, 1918.*

ARTHUR LYON RYDE (President) in the Chair.

It is to be regretted that the Paper I wrote on this subject several years ago has been lost since I left my office on the outbreak of war. Notes for this Paper were made at odd moments in the Mohmand Country, North-West Frontier of India, and the Paper itself has been written without my models and without much information which at home would have been at hand. It has also been written at odd intervals between duties and during the Indian hot weather.

There are so many different points to touch upon if one, labouring at a distance, is to forestall every objection likely to be raised by possible opponents. Consequently I have tried to deal with certain points by means of appendices, as the reformer of our remnants of systems of measures and weights has nothing to hide either under a bushel or under a hektoliter.

PROPOSED REFORM OF OUR MEASURES AND WEIGHTS.

The use by our commercial rivals of calculating machines and slide rules based on logarithmic tables has for many years given them a great and growing advantage over us in factories, in the office, on the farm, and elsewhere.

It is impossible for us to use these rapid businesslike methods for multiplying or dividing unless, instead of a conglomeration of measures and weights, we have a "system" of measures and weights (i.) with a common radix—or regular system of multiples and submultiples between the units—throughout, and (ii.) in which the measures and weights are inter-related.

Let us first consider the question of a radix.

A RADIX.

The Binary System (Latin, *bini*, two by two) is a system based on the convenience of doubling or halving any quantity. Tribes in Central Africa have been found which count on a radix or basis of 2 instead of 10. But an advance on this is to adopt a radix of 8 as a convenient basis; thus, multiples of 2, 4, 8, 16, 32, &c., and submultiples of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, $\frac{1}{128}$, &c. This system is well illustrated in our measures of capacity, namely, three distinct denominations called quartern (or gill), quart (of milk, for example), and quarter (of wheat); a one-pound loaf, too, was the quarter of a quartern loaf. We also get denominations of 640, 16, and so on.

Appendix III. shows that the Metric system, although

decimal, is not at a disadvantage compared with a Binary system in the "series" possible under it.

The Duodecimal System is based on a radix of 12. There is much to say for the number 12, as it can be divided by 3 and its double, though not by 5. On the other hand, the fact that mankind has learned to count in tens and not twelves has always proved insurmountable, and will probably continue to do so for at least 1 t, ttt years, as a duodecimalist would write it. The proposal of the duodecimalists means that we should have two new symbols for 10 and 11, *e.g.*, the initial letters "t" and "e," and that the symbols for 12 should in future be 10—meaning one complete set with nothing added after it. New names would be required for 10 and all subsequent numbers; 5×4 would be called 1-don-8, and in symbols would be 18, and so on. We cannot wait until all mankind, all our customers, have agreed to adopt a different system of counting, but must put our house in order straight away in readiness for the world-wide commercial conflict which is about to break out. Our lessons in the last three years should have taught us that in all warfare we must have up-to-date weapons.

When we have discussed the inter-relationship of measures and weights, I think it will be clear to all that if man had had 12 fingers and 12 toes, and had thus learned to adopt a radix of 12, either his primary standards of measures and weights would have been unhandy, or else their duodecimal multiples and submultiples would have been inconvenient and unworkable. If any one doubts this, let him try and put down in black and white what primary and secondary standards he suggests, together with equivalents in imperial and international measures and weights, and

state how long he thinks it would be before we could adopt such a system of counting and of measures and weights for ourselves and our customers.

The Decimal System.—The whole civilised world has adopted a radix of 10, that is to say, it counts and calculates in tens, hundreds, thousands, &c., and most of mankind has adopted some system or other of measures and weights, also coinage, based on this system of counting. The principal objection to this system is that although 10 can be divided by 5 it cannot be divided by 3. Beyond saying that a radix of 9 is the best for a sub-division of 3, this last point is dealt with in Appendix III. (B) in order to avoid interrupting the thread of discussion here.

On the general question of a radix a little thought tells us it must be either 8, 10, or 12, and it seems obvious to me that further thought and study will reveal the fact that we were not created the wrong way, but that the number 10 is the happy medium and a compromise.

PAST SYSTEMS AND OUR PRESENT TANGLE.

Before any reform is suggested it is necessary to examine our past system and our present collection of units of measures and weights, for we now have no "system." Probably most of the measures and weights which are in use throughout the British Isles had a genesis common with those of other European nations, but from a number of circumstances differences arose, and when once this happened, intercommunication in the country being bad, the differences became accentuated. Even locally the measures became corrupted, so that there were, for example, three different gallons

for ale, wine, and beer, to say nothing of the many different sized acres.

Mention of these facts is important, as I want everyone to disabuse himself of the idea that exceptions should be made specially and permanently for this or that trade or profession, for landed proprietors, and so on. It is the exceptions and local customs, which were allowed to grow up in the past, that have brought us to our present muddle.

As our race developed into a homogeneous body, units were introduced corresponding, as nearly as possible, with the average of local denominations, but in this process we lost nearly all traces of a regular system of multiples between the units. Thus the decimal gradations of the old English mile (Latin, *mille*, a thousand) and of the bushel were lost, and the hundredweight has become the one hundred and twelve weight (see page 243). Further, the measures of extension, weight, and capacity entirely lost their inter-relationship.

Reforms eventually followed this chaos. Between the years 1215 and 1800 either the yard, pound, gallon, or bushel were altered in eighty-three different Acts of Parliament. It is quite erroneous, therefore, to think that our measures and weights, as we have them to-day, have come down to us without change from time immemorial; they are in fact comparatively modern, many of our present units not being a century old.

The first great step towards the recovery of a better past was made in 1824, when the imperial gallon was altered so as to make it equal to 10 avoirdupois pounds' weight of water, and that is the only inter-relationship we have between our weights and the measures of capacity.

But we have only had patchwork reforms, and

to-day, instead of a common radix, we have the following unscientific and unbusinesslike gradations in our legal "tables":—

12, 3, $5\frac{1}{2}$, 40, 8; 1,760; 7·92, 100, 80.

144, 9, $30\frac{1}{4}$, 40, 4, 640; 100,000.

1,728, 27.

7,000, 16, 16, 14, 2, 4, 112, 20.

2, 4, 2, 4, 8, 36, $9\frac{3}{8}$.

A fuller explanation of these appears in Appendix I., and in Appendix IV. a sum showing the ease of calculation under a decimal system as compared with our own. It will be seen that our measures and weights have not only no radix, but there is no guiding principle nor "system" in them. If anyone doubts how cumbersome the above gradations are, let him for one moment imagine any one of the sets introduced into our money tables.

Added to the confusion we have "heaped" measure and other local customary measures and weights, which, as such, are illegal, and yet books of tables perpetuating illegalities are allowed to be published, and children are taught what they can afterwards be punished for using.

The imperial measures and weights are used with frequent modifications in the Oversea Dominions. Thus in some our obsolete troy pound (see footnote on page 243) is still the primary standard instead of the avoirdupois pound; and land measures frequently differ from the imperial and surveyor's special measures. These modifications and differences will have a tendency to increase until such time as we adopt a system, or the Empire on this question breaks apart.

Then there is India with her numerous peculiarities, local and trade customs, and these, speaking generally,

are a curse to the great masses of the people. In a letter I received from the Government of India on the subject it is stated "There is no uniform code of native weights and measures in British India, which differ, indeed, from district to district, and in different markets in the same town." From copies of reports enclosed with the letter it is clear that the Legislative Councils are waiting to introduce a general reform until the Imperial Parliament has adopted a rational system. The railways, however, have adopted the maund of 40 seers, and have related it to the avoirdupois pound, although the seer approximates to the kilogram,* and is inter-related with the seer measure of capacity.

Reference should also be made to the United States of America, as from their experience we can learn that the time has passed when every state can be a law unto itself on this question. It being realised that a decimal system was preferable, some States in the Union decimalised on the mile, some on the yard, and so on. The results were not satisfactory as the various units were not decimally related, and, apart from the differences between the various States, they diverged from such natural constants as the horse-load or ton and handy or primary units. The result has been that, although relics of what one may term heretical decimalising remain, in most instances the local practices have been abandoned. The measures of capacity are the old Winchester

* The railway seer is equal to 0.933 kilogram, and therefore 15 seers are equal to 14 kilograms, and 40 seers are equal to $37\frac{1}{2}$ kilograms. The maund is therefore almost exactly equal to $37\frac{1}{2}$ kilograms, equal to 75 half-kilograms or metric pounds, or in other words to three-quarters of a centner (as the metric "hundredweight" is called by some). These figures show how much more convenient International weights would be in India than are the Imperial. In Appendix VI. are given two extracts from reports to the Government of India on the subject of measures and weights, supplied to me by the Government of India, and a suggestion.

measure, and we also find gross tons of 21 cwts. (2,352 lb.), long weight (2,400 lb.), British tons (2,240 lb.), and tons of 2,200 lb. and 2,000 lb., but most of these, being unrelated to the natural ton, have been discontinued. We now find the International or Metric ton, equal to 2,205 lb., being used. All this is another instance of how differences in practice between ourselves and other Anglo-Saxon communities will creep in unless some proper system is adopted.

One of these practices should be especially mentioned, namely, the change we made in the hundredweight years ago in order that our goods when sent abroad should not be under weight compared with Continental standards. To revert to a hundredweight of 100 avoirdupois pounds would therefore be a backward step, and help to oust us from the world's markets.

I submit that with all the confusion in our own collection of measures and weights, with our local customs (particularly as to selling our staple food, corn), with illegal "tables" on sale, with differences in practice between ourselves, the Oversea Dominions and India, the United States of America, and other countries which may become embodied in the Empire, the possibility of adopting a modern system throughout the whole Empire and Anglo-Saxon speaking world, for all trades and all professions, may seem hopeless to the weak-hearted.

But I will endeavour to demonstrate that the difficulty is not so great as at first sight it appears. To begin with, if we make a change, the British world has through its Chamber of Commerce, &c., promised to follow suit. All we have to consider, therefore, is the legal units in and for the British Isles.

The question simplifies itself still further when we

realise that the British primary standards are as follows (Weights and Measures Act, 1878, secs. 10 to 15) :—

Lineal	...	...	...	The yard.
Weight	...	...	...	The pound.*
Capacity	...	...	...	The gallon.

All our other denominations are multiples or sub-multiples of these (Weights and Measures Act, 1878, secs. 10 to 17), and it is essential to remember what these primary standards are. No one should think, for example, that our standard of length is either the mile or the inch, or that our standard weight is either the grain or the ton. Such extremes are too unhandy for scientific accuracy to be primary standards.

I will not trouble you with how the yard, pound and gallon are supposed to have become less than the average corresponding units of the French before that nation unified its measures and weights, but we can trace that the old Scotch and Irish pounds, and the old Scotch and Irish acres, for example, were larger than the corresponding English units, and in fact corresponded closely with French units; and we know that we had to increase our hundredweight from 100 lb. to 112 lb., and our rod from 5 yards to $5\frac{1}{2}$ yards, the last increase being because the old English, the Scotch and Irish yards were all longer than our present yard. It is a pity that at the

* Namely, the avoirdupois pound. There has been no standard troy pound since the destruction of the standard by the fire at the Houses of Parliament in 1834, and the standard was formally abolished by the Weights and Measures Act of 1855, being replaced by avoirdupois weight from which the troy "ounce" and its decimal multiples and sub-multiples are now derived (Weights and Measures Act, 1878, secs. 14 and 20). How troy weight might be allowed to die a natural death is set out in Appendix V. (B). Apothecaries' measures and weights are now replaced in the British Pharmacopœia by the International.

Act of Union we did not adopt the Scottish pound ; if we had we should probably have adopted the Metric system long ago.

When the French decided to replace their local measures and weights by standards for their whole country, they decided after careful study on the following essentials for any new system of measures and weights :—

- (1) That their new units should be such as to give approximations to the average of their local units and to those of other European countries ;
- (2) That these should be so adjusted that the measures of length, weight and capacity should be inter-related throughout ;
- (3) Necessitated by (2), that there should be a common radix throughout ;
- (4) That natural constants such as the ton or horse-load could not be abandoned, but might be slightly adjusted.

At the suggestion of an Englishman, James Watt, the French adopted the radix of 10, and then, so as to make their measures of length, weight, and capacity interdependent, they doubled their approximations to our pound and gallon. We may therefore expect that their new standards have some approximation, some affinity, to our yard, double-pound and double-gallon. Briefly we find this: *If we increased our yard, double-pound and double-gallon approximately 10 per cent., we could have International units.* (See Appendix II.)

I have now come to a crucial point. It may be asked, If our present primary units are approximately 10 per cent. less than those of the International system, why could not we subject them to slight adjustment so as to make them exactly 10 per cent. less than units of the International system, and thus have a decimal system of inter-related measures and weights of our own, and yet easy of comparison with the International system?

The answer is simple, namely, that if our yard were made exactly 10 per cent. shorter than the meter—that is to say, 9-10ths of the meter—the square yard would be 9-10ths of 9-10ths of a square meter, or 81-100ths of a square meter, and the cubic yard would be 729-1,000ths of a cubic meter. It is clear, therefore, that not only our square or cubic measures would have an awkward relationship with the International units, but that all the weights and measures of capacity, if derived from the cubic measures, could not be 10 per cent. less than the International, but would be less than three-fourths of the nearest International denominations. One ton and one pound, for example, would be considerably less than three-fourths of our present ton and pound. Our foreign customers admit our goods are best, but they are not prepared to accept three-fourths the quantity which other countries supply.

So far, I have tried to show that, for commercial and other reasons, we should abandon our present confusion of measures and weights and have a system based on a common radix; that that radix should be 10; that our measures and weights must be inter-related; that if we use one of our present standards from which to derive the others we shall still not be in line with the rest of the world; and that it is mathematically impossible to

make all our primary units exactly 10 per cent. less than the International if they are to be inter-related.

We may continue to search as Germany did, and experiment to see if we cannot found a system of our own surpassing the International system if possible, but experiment how one will, everyone must start on the same principles—the essentials mentioned above—with which the French started their work. The Germans speedily came to a decision and acted thereon. Although the memories of 1870 were so recent they adopted the system (not the coinage) of their enemy, and since then many other nations have done the same. As a result the Metric system has now become International, and those nations who have adopted it have felt the benefit in their international trade relations.

I submit that it behoves us, especially in these times, to stop looking about but to examine the International system and realise how easily one can work with it. We shall then see if it is possible for us to adopt it in our profession, whether or not it is adopted generally in the country. It should be remembered that the system is already permissive in Great Britain, but it is seldom that an individual can use it by himself any more than anyone could alone start using a brand-new system. It is for the Government to act.*

* Before describing the system it is necessary to point out that it is a misconception to think that by the Metric system we include the French, now the Latin Union, coinage. It is possible to adopt the Metric system *en bloc*, for example, without adopting the coinage of the Latin Union. The misconception has arisen from several reasons, principally that the coinage of the Latin Union is decimal, that it has a decimal "fineness" or alloy, and that the coins have been made to metric weights and measurements. The author's opinion as to decimal coinage is set out in Appendix V. rather than in a paper on measures and weights, and is given merely to show that he has no wish to avoid any question arising out of this subject.

THE INTERNATIONAL SYSTEM.

The fundamental unit, or primary standard, is the *meter*.* It is of such a length that, for all practical purposes, it may be taken as equal to the ten-millionth part of the arc of the meridian extending from the Equator to the Pole. It is certainly sufficiently near that value† to be convenient in calculations relating to terrestrial distances both on land and sea. The Parisian man, or even child, when asked the distance, for example, from Paris to Timbuctoo, or to French Cochinchina, is taught to picture those places on a globe, and can thus easily compute the respective distances. The British man and child have no such easy system in their minds with which to judge great terrestrial distances. And we must remember that we belong to a map-making profession, and that by international agreement our parish and town maps, and our large terrestrial surveys of the Empire and the world, are drawn to the International scale. To this I will refer again later.

The meter has decimal multiples and submultiples, the former being denoted by Greek prefixes, with the hard "k,"‡ and the latter being denoted by Latin prefixes, with the soft-sounding "c," excepting that there is no "c" in the soft-sounding prefix "*milli*." The Greek and Latin prefixes are numerical, and are used also for the measures of capacity and weights.

Here is a boxwood meter made to British pattern.

* In this Paper and elsewhere the Anglo-American spelling and pronunciation are adopted.

† A more recent calculation has given a difference of the thickness of a sheet of paper (1-6,000th) in the length of a meter taking the meridian passing through Dunkirk and Barcelona.

‡ Anglo-American spelling is adopted.

Surely it is a handy measure. It has been said it cannot be divided by four, but if I fold it so, it proves it can be, and it can be similarly made to fold into three or five lengths.

The side of this model represents a square meter, and the model represents a cubic meter. On this side it is shown that a cubic meter of water weighs 1 ton (International) and measures 1 kiloliter. The model makes it clear what is meant by inter-relationship of measures of length, weight, and of capacity. A cubic yard of water contains no convenient weight or unit of capacity, and it weighs less than three-quarters of a ton.

A tenth of a meter is called a decimeter. This model represents a cubic decimeter. A cubic decimeter of water weighs one kilogram—here is a kilogram weight—and measures one liter—here is a liter measure. Surely the kilogram and liter are handy too.

This meter, this kilogram, and this liter, are the International primary units. I can hold all three in my hand at one time. Handy units, I say once more. Here are a yard and pound weight for comparison; also a double-gallon measure and a dekaliter.

This smallest model represents a cubic centimeter. A cubic centimeter of water weighs one gram and measures one milliliter.

Taking these three cubes, 1,000 of these cubic centimeters are equal to this cubic decimeter, and 1,000 of these cubic decimeters are equal to this cubic meter. Also, therefore, one million of these small cubes are equal to one large cube. Our competitors can therefore as readily grasp what "one million" means, as what "a thousand" means.

Lineal measures, weights and measures of capacity move in tens; superficial measures in 100's, and cubic

measures in 1,000's. However, as lineal measures are so often used in computing measure of capacity and weight, those to whom the Metric system has become habitual often use gradations of 1,000 for measures of capacity and weights; thus, the milligram, gram, kilogram, and ton. For example, T 5·463 would be read 5 tons 463 kilograms; T 5·463721 would be read 5 tons 463 kilograms 721 milligrams.

A little practice in handling the actual measures and weights soon teaches us their inter-relationship as follows (gradations being in 1,000's):—

- 1 cubic millimeter of water weighs 1 milligram.
- 1 cubic centimeter of water weighs 1 gram and measures 1 milliliter.
- 1 cubic decimeter of water weighs 1 kilogram and measures 1 liter.
- 1 cubic meter of water weighs 1 ton and measures 1 kiloliter.

By the time one has mastered this short table he practically knows the International system of measures and weights. Such a grand and simple system annihilates compound arithmetic. It is its very simplicity which has probably handicapped its progress with us. It is understood in a few minutes, against months to learn our own tables, but we have the actual units of the latter to handle. The point is, no one has tried to teach how we can pass from our present muddle to a new system, all relying in this matter on the Government.

USE OF SPECIFIC GRAVITIES.

On this side of the cubic meter the specific gravities (s.g.) of certain materials are shown, that is to say, their weight as compared with water. The time saved through

not having to teach the children of foreign countries a lot of complicated tables is partly utilised in teaching them the s.g. of common materials. But, in case one might forget, many s.g. are stamped on the lineal measures and given on the slide-rules. Thus one can measure up with lineal measure a lump of iron, cement, stack of bricks, corn, and so on, and can convert them into tons mentally; and he knows instantly, for example, how many horses will be required to remove the materials, and how many tons space must be allowed on a barge or ship to carry their weight by water.

Starting with water, therefore, this cubic meter of water is an International ton or horse-load.*

This line across the middle of our model clearly indicates that 1 ton of clay occupies half the space of a ton of water, or half a cubic meter, because it is double as heavy. Half a cubic meter of clay would therefore require a ton space on a barge; a railway truck carrying so many tons must be loaded with only half that number of cubic meters of clay, and so on. A policeman on Ludgate Hill looking at the material in a cart could tell at a glance, or by measurement if necessary, whether a horse was overladen or not; and with practice all of us would do so.

Taking the s.g. of steel at 8, that is to say that, bulk for bulk, it weighs eight times as much as water, and dividing this 8 into 1 meter of 100 centimeters we get $12\frac{1}{2}$ or 125mm., and we know that a ton of iron would measure 1m. by 1m. by 0.125m., and contain cubic meter 0.125 or 1-8th of a cubic meter. To float a piece of steel to the water's edge we should have to place it in a vessel eight times its bulk.

* With the imperial measures and weights 1 cubic foot of water weighs 62.288 lb.

The s.g. of *lignum vitæ*, ebony and ironwood are all over 1, and therefore we know these woods would sink in water, and that a ton of such woods would occupy less than a cubic meter.

The s.g. of oak averages, say, 0.9 or 9-10ths weight of water; it will therefore float, and it therefore takes up 10.9ths the space of water or 1.1 cubic meter, and lifting up this arm on our model, we see oak marked at the height of 1m. 1dm.

Spruce fir is half as light as water, and a ton would occupy 1m. by 1m. by 2m. or 2 cubic meters, and half of it would float out of water and half be submerged.

These other marks on the arm of our model tell us at a glance the space which would be occupied by a ton of wheat or barley, namely, these heights on the base of a square meter.

And so we can go on with every material on the face of the earth. It is idle, therefore, to urge, as some have done, that the inter-relationship of the measures of length, weights, &c., is only useful when we are dealing with water. Where we use our brain tissues and are still liable to errors the foreigner uses his hand and the slide-rule, and is more likely to be correct in his calculations.

But let us look for one moment beyond the use of such a system to land surveyors, and realise the importance it would be to the nation which is desirous of, and whose very life depends upon maintaining, the largest mercantile marine in the world.

If it becomes necessary for us to be and remain a nation organised for war, then the forester and the farm labourer from the country estate, the bricklayer, the ironworker from the foundry, and so on, must be readily fitted from the knowledge gained in their own callings to take their places, immediately and side by side, in

docks or at the railhead, or in loading (not overloading or underloading) A.S.C. wagons in a desert, for example.

In the past our forefathers were ready to lay aside their ordinary avocations and become soldiers. To-day, and even more so in the future, if we are to follow in their steps, we must adopt more scientific methods in all phases and departments of life; our measures and weights, for instance, must be adapted to all phases of industry, and not merely to this or that particular trade or profession.

METRIC ARITHMETIC.

From the forest, the field, the builder's yard and the foundry let us turn to the man in an office, first in civil and then in army life. He has to work out, for example, what 5 tons 11 cwts. 3 qrs. 23 lb. would cost at £5 11s. 6d. per ton.* The working is given in Appendix IV. If we had a decimal system the sum could be done by logarithmic tables, or by a calculating machine by placing 5·5977 (equivalent of tons, cwts., &c.) on the machine, and by 22 turns of the handle, multiplying it by 5·575 (the equivalent of £ s. d.); answer, £31·207 (or, say, £31 2 florins 7 farthings). I have seen this sum done on a machine in 10 seconds, and the answer did not require checking, as the machine would break down before giving a wrong answer. But even by logarithms the saving is 73 figures, besides time and brain fatigue, and the answer is more likely to be correct. And the poor clerk, in order that the shipper may compete with his foreign rival, has to take less salary. But give the British clerk

*The example here given was a fair test imposed by a shipping merchant, when selecting two lads from a number of lads over 14 years of age (*vide Daily Telegraph* under "Sham Education," in October, 1903). Not one of the lads was able to give the correct answer.

a decimal system and machine, and he will be able to compete with all rivals, just as he has been able to do so on the battlefield. Further, in time of war he would in the office, stores, docks or *depôt* be talking the same commercial language as the forester, farm labourer, ironworker, and others.

In addition too we should have one general rule for measures, weights, and perhaps money, namely, to add up the columns and carry forward the tens, following the method used in adding up ordinary units, tens, and hundreds, "simple" addition as we called it at school, instead of having all sorts of factors to divide by before carrying forward.

Rainfall provides another useful illustration in arithmetic. Supposing 23 millimeters of rain have fallen, then a metrician knows, straight away, that 230 tons weight, or 230 kiloliters measure, have fallen per square hektometer.* It may represent so much manurial value to the crops, or so much water to the ponds, or so much water to pass through the surface water drains.

Again, if we are told that the barometer has fallen 1 inch, equal to a reduction in the weight of air of half a pound per square inch, we do not realise that the crops have been affected by the sudden removal from off them of 1,400 tons weight per acre. But when we have accustomed ourselves to the International system the calculation would be so easy that the mind would readily pass on to it. Half a pound per square inch would be replaced by 1 kilogram per square centimeter, and this is almost the exact pressure of the atmosphere at sea-level.

* Known in the land agent's world as the "hektar," the word *ar* or *are* meaning area.

THE PRACTICE OF LAND SURVEYORS.

As no working system is before the world other than the International, it is the only system we can now discuss, and I wish my Paper could have been started at this point.

First let us see what the practice of surveyors has been in the past.

The land surveyor's chain of 22 yards is divided centesimally into 100 units, each of 7.92 inches: it was introduced by Edward Gunter in 1620, but only authorised by Order in Council on 27th June, 1876. For levelling, that is to say for our vertical work, we surveyors use the centesimal part of the foot. These usages, one of 300 years' standing, and the fact that in towns we use a chain of 100 feet, demonstrate that surveyors have always preferred to work with a decimal system, and we must admit that even our partial adoption of some method of tens has helped us immensely. But it would help us, in many calculations that we now cannot even dream of, if our lineal measures were decimal and our square measures centesimal instead of the reverse being the case. Thus the side of an acre is the square root of 10 square chains, or of 100,000 square links, and the square root of these figures is not a whole number in either case.

The following examples further illustrate the inconvenience of the present units used by surveyors:—

A fall of 8 feet per mile is 1 in 660, which requires quite a mental effort.

A fall of 1 in 600 is 1 foot in 9.09 chains—rather appalling figures.

1,597 inches equals 2 chains 0 yards 1 foot 1 inch, but no association of ideas carries the mind from one set of figures to the other, whereas it is seen at a glance that their metric equivalent of 40,564 millimeters is also 40m. 564mm.

Although the centesimal foot has certain advantages, it is a pity our horizontal and vertical measures and scales should not have a common basis.*

There are no square furlongs and no lineal roods.

The side of a square-shaped acre is about $208\frac{3}{4}$ feet.

If the International system is adopted by us we could have a chain of 20 meters in length (equal to 21·87 yards instead of the 22 yards), divided into 200 links of 1 decimeter, or 100 links of the double-decimeter (equal to 7·87 inches against 7·92 inches in the link), and probably we should carry 5 pins instead of 10; and for levelling we should use the centimeter (equal to 0·39 inches) instead of the 1-100th of a foot (0·15 inch), the former being a much more convenient unit for the sight, as the sample levelling staffs show. The centimeter levelling staff has been made in this country for many years for exporting to foreign countries and to some of the Oversea Dominions.

Thus our land surveying and levelling units could be metric throughout, and agree with the units of length to be used in all other trades and professions.

Land surveying brings us to the question of our Ordnance maps. Our original Ordnance survey is known

* It may interest some to know that in South Africa the Dutch foot is often used for land, that is to say, for horizontal measurements, and, on the same plan, the vertical scales are for the imperial foot, because the buildings are to imperial measure.

as the "parish map," the 1.2500 as some call it, as it is to the scale of 1 meter to 2,500 meters, or expressed in another way, 4 decimeters to the kilometer. And the new town maps are to the scale of 1.500, or 2 meters to the kilometer. These scales were decided upon at the International Statistical Conference held at Brussels in September, 1853.

Yet what do we do? We do not even show an International scale on our maps, but only the reference fraction 1.2500, which the foreigner at once recognises as metric. But we indiscriminately—criminally I nearly wrote—describe them as to the scale of either—

Parish map ... (a) 1 inch to 3·156 chains;
 (b) 1 inch to 208·3 feet;
 (c) 1 inch to ·0395 mile;
 or (d) 25·344 inches to 1 mile.

New town map ... (a) 1 inch to 41·66 feet;
 (b) 126·72 inches to 1 mile;
 or (c) 10·56 feet to 1 mile;

and then, as though still further to hide the fact from the British people that the maps are really metric, we have the "sheet lines" (to use a technical expression for the lengths which the sides of the map represent) to scale to British denominations.

Messrs. Stanford have prepared for me the maps pinned up on the blackboard. They are made from the parish and new town maps of a naval base, and show plainly that our original Ordnance maps are metric, and how the sheet lines could be adjusted to metric measures if desired. I chose this example of a naval base years ago as a warning, and since writing the draft of this Paper I have heard that that naval base has been

bombed. How easy when the flights are by kilometers and the maps of the land below are in kilometers, and when we surveyed the land for the enemy and plotted them to their scale, which we have so far not adopted for ourselves! If a foreign army were landed in this country all the sightings of the enemy's big guns, rifles, &c., would be to the same system of measures as our maps. But with us they would be different, and the scales on our maps are so complicated that, in our own country and with our own maps, we should be more liable to errors regarding distances than the enemy would be. And yet the primary object of our maps was for military purposes, as the name "ordnance" indicates.

The parish and new town maps are photographed down to smaller scales, by complicated mathematical calculations, to the scales of 6 inches to 1 mile, 1 inch to 1 mile, and so on, until almost all trace and remembrance of the International system is obliterated and forgotten by the British, but not by the enemy.

It should be noted that scales such as 10 inches or 10 feet to 1 mile are not decimal scales, as the inch and foot are not decimally related to the mile. A decimal scale is 1 of any unit to 10, 100, 250, &c., of the same unit, and such a scale makes it possible to use the map to any unit whatever of any country.

Further, we have had the full use in this war of the maps, for example, of France and Belgium to International scale. What have we done with them? Drawn lines across them showing blocks of one square mile and decimal divisions of the mile (1,760 "yards"),* and so on. Yet the reports come to hand, "We have advanced

* I have not seen these maps, but understand more recent issues show squares representing 1,000 yards. One-mile squares and decimal divisions are, however, still used on the maps of N.W. Frontier of India.

“*x* ‘meters’ on a frontage of *y* ‘kilometers.’” The plain business man would describe all this confusion as disgraceful. Are our guns sighted to fit in with decimal divisions of a mile or to chains? No, but in 100’s and 1,000’s of yards. And yet an approximate 10 per cent. change of the old sights would have given meters (all sights of new guns could have been made metric), and we should not have had to waste time altering the French and Belgian maps.

Areas.—Another question may be asked. If all our principal Ordnance maps are really metric, how could we show the areas thereon in metric denominations? Once more the answer is simple. Present areas are shown in acres and decimal parts; printed conversion tables could be issued as in the old days, when land agents troubled to convert decimal parts of acres to roods and poles, and on all reissues of the sheets the metric areas would be inserted instead, and metric scales shown on the maps. In the meantime an approximate rule would be to multiply acres by 2 and divide by 5, or multiply by 4 and point off one place to bring to hektars.* Tenants of estates would perhaps receive from their landlords revised schedules of their lands, and when wishing to grub up hedges, &c., so as to make their fields more suitable for motor-ploughing, would, where just as convenient, replant new boundaries so that convenient metric areas were enclosed.

Contour Lines.—The contour lines on our maps are generally shown at intervals of 50 feet, 100 feet, or 200 feet, equal in meters to 15·24, 30·48, and 60·96. These intervals do not affect our commerce, farm work,

* Approximately $2\frac{1}{2}$ acres are equal to 1 hektar: the error is only about 1 per cent.

&c., and therefore this is less important, but I suggest that when the maps are revised, by rotation which occurs about every 14 to 20 years normally, intervals of 25 and 50 meters should be used. The contour lines are mostly sketched on by experts, all of whom could just as readily sketch on the new intervals; in fact, surveyors or the military could generally calculate for themselves from the existing lines where the metric intervals come. These vertical intervals are important for artillery and machine gun work, and we may rest assured that the Germans have placed such vertical intervals on our metric maps for their use if occasion arises.

Spot-levels could, of course, easily be altered.

Timber.—Measuring for round timber would be done by the same formula as now, but the quarter-girth would be taken in centimeters instead of inches and fractions, and the length in decimeters instead of feet and inches, and the result divided by 100 would give cubic decimeters instead of cubic feet. Knowing the specific gravity of any particular timber (and they would be given on our measuring poles or in our new “Hoppus”), the contents of a tree could be readily expressed in kilograms or parts of tons also. Underwood would be calculated by the cubic meter or short hundreds (five-score). Hewn imported timber is generally to metric dimensions, although we take near imperial equivalents and work laboriously with them.

Hay and Straw Stacks.—The weights are now calculated by estimating the weight of a cubic foot or cubic yard, and would be measured up into cubic meters, the weight of a cubic meter being the unit to be estimated, conversion tables being used until those

concerned were accustomed to the new unit. A few might prefer the method of estimating what height a ton would be, the base of which was 1 square meter, but hay and straw being so light, I have not shown any height on the arm of the model.

Two trusses of hay and 3 of straw would go to the centner, and 40 and 60 trusses respectively to the metric ton. The new system would not interfere with the stackman's method of cutting by measurement, but if 100 lb. avoirdupois were adopted for the hundred-weight it would interfere with the cutting, the difference in this case being so great.

Corn.—Quite apart from what system of measures and weights we adopt, unless corn in the sack is sold by weight only, or by measure only, there will always be the four methods of sale by weight, measure, measured weight, and weighed measure (see Parliamentary Paper 279, of 1892, entitled "Corn Sales"). Probably the best method under the International system is to sell all quantities above, say, 10 kilograms at per 50 kilograms (sometimes known as a centner or 100 International pounds). Reasons have already been given for not adopting the 100 avoirdupois pounds. If all Government returns were published in weight only, anyone could readily ascertain the fair price of the loaf. But should it be desired to retain the system of measure by weight, then convenient statutory hektoliters for wheat, barley, and oats, would probably be respectively fixed at 150, 125, and 100 half-kilos or International pounds. My own opinion is that the farmer would always be thankful for the adoption of the Metric system if for no other reason than that its introduction would be the means of simplifying the methods of converting produce into

money. At present there are at least 200 different standards for the sale of agricultural produce.

Tithe Rent-charge.—Some years ago I experimented with the above convenient figures for wheat, barley, and oats, and found that they would not affect the average value of tithe rent-charge for the years 1835 to 1905 to any appreciable amount; in fact, if Norfolk malting barley were sold by weight any small difference would be neutralised. The question is only of interest to the few experts who have the fixing of the annual value of a £100 tithe rent-charge; but should anyone wish to go further into the question, I would refer him to the Parliamentary Paper on "Corn Sales" already mentioned and to pages 148 to 150 of "Martin's Tables." The particulars there given show that one of the most complicated of all questions has an easy solution in figures easily retained in one's mind.

Tithe Maps.—These can follow their present course as, little by little, on redemptions and reapportionments taking place, the Ordnance maps, which, as already pointed out, are to International scale, will be substituted for them. When once the transfer is complete undoubtedly much source of dispute as regards the endowments of colleges, cathedrals, and churches will be removed. As many of us know, also, much of the work on which we are employed in this connection gives us much trouble and little profit.

Title-Deeds.—As regards areas or lineal measurements mentioned in title-deeds the metric equivalents could be endorsed on any deed, or schedules could be attached to the deeds. Upon all changes through death or alienation only metric quantities would be allowed in estate duty valuations.

Manor Rolls.—Similarly manorial court rolls would have to be brought up to date, and all areas converted to metric equivalents and agreed to by the lord and tenant as occasion arose.

The Railway Mile.—I once suggested a railway mile of 1,500 meters (a reduction of about 4 per cent.), the penny also being reduced in value 4 per cent. by making 1,000 farthings, instead of 960 farthings, to the sovereign. But a railway expert pointed out to me that railway stations were neither an even number of miles nor kilometers apart, but odd distances, and that the rates were in Great Britain worked out from station to station. But, he said, if a decimal system of measures and weights, and perhaps coinage also, were adopted, we could with calculating machines work the charges out quickly and to a nicety. I mention this as an example that it is not for us, in this discussion, to go outside questions cognate to our profession, this being a question for the railway companies to settle with the Government.

The Road Mile, however, would probably affect many surveyors. Stones or iron discs (painted a different colour to the background) would eventually mark out, for instance, kilometer distances. There would be no special urgency about this, but there would be this difference—places for fixing the new stones would be settled by scaling off the distances from our maps, which are already metric, and thus all the new stones would be equidistant, which is more than one can say of our present milestones. If anyone doubts this, let him ask both the pedestrian and the garage proprietor, and also himself, when he pays the bill. The advantage of scaling off is that if one stone is placed wrongly it will not affect the remainder.

QUANTITY SURVEYORS' WORK.

Quantity surveyors could not fail to appreciate the great help which the inter-relationship of measures and weights would be, quite apart from the decimal facilities in calculations. Calculating machines and slide-rules will take the place of much clerical labour, which apparently will be scarce in the future. There need be no appreciably long transition period for quantity surveyors, because manufacturers would at once publish revised catalogues in metric terms. How simple price lists in the future would be may be seen by taking the quotations for cement as an example; it is now quoted by the ton, hundredweight, cental, yard, cubic foot, hundred, peck, chaldron, basket, bushel, bag, and so on.*

I trust quantity surveyors' work will form the subject of a special paper by one more competent to deal with it, but I should like here to refer to the rod of brickwork and planwork. The side of a square rod of brickwork is $5\frac{1}{2}$ yards, equal to 5.029 meters. If this were reduced to exactly 5 meters, or in the proportion of 5,029 to 5,000, the reduction of itself would not necessitate any alteration in the size of the brick, as a rod is not necessarily composed of an exact number of bricks and joints. But it would be also necessary to express the brick in metric terms. The Royal Institute of British Architects has fixed the average size of a "standard" brick in inches as 9 by $4\frac{3}{8}$ by $2\frac{11}{16}$; the equivalent of this in centimeters is 22.73 by 11.05 by 6.78. These figures would probably be modified into $22\frac{3}{4}$ by 11 by $6\frac{3}{4}$, the slight differences being within the margin

* This was written several years ago. The writer is unaware of the present practices.

of error allowed. A metric brick with joints, I suggest, might be reckoned as 24 by 12 by 8 (centimeters) in the same way as the present brick and joints are often considered as being 9 by $4\frac{1}{2}$ by 3 (inches). A square rod of brickwork would be 25 square meters instead of $30\frac{1}{4}$ square feet.

Where house plans are now plotted to the scale of 1-96th (8 feet to 1 inch) they could in future be plotted to a scale of 1-100th. In this way $1\frac{1}{2}$ brickwork would on a plan be practically the same as now. But I only throw out these figures as hints, and trust the quantity surveyors present will help us in the discussion.

ARGUMENTS FOR AND AGAINST REFORM.

Whatever reform we adopt there will always be the following arguments to overcome: The trouble, the difficulty of organisation, the cost of change, and the fact that the measures and weights of our forefathers should be good enough for us. Let us deal with these.

The Trouble.—The trouble to the few on whom the responsibility of organising the change would fall would doubtless be considerable. They would, however, be officials, and their trouble would be met by their salaries. The trouble to the community would be small if the organisation were well thought out. Any trouble which might be experienced would be justified when the question at issue is whether we are to survive or go under.

The Organisation.—Whatever reform is undertaken it will require Government organisation. If we can organise for a huge military war we can easily organise for this trade war. An official of the Standards Department of the Board of Trade told me years ago that that

The Surveyors' Institution.

(INCORPORATED BY ROYAL CHARTER.)

12, GREAT GEORGE STREET,

WESTMINSTER, S.W.

NOTICE.

ANNUAL GENERAL MEETING.

The Annual General Meeting of The Institution, to receive the Report of the Council and the announcement of the result of the Election of Officers for the ensuing year, will be held in the Lecture Hall on Monday, 27th May, 1918, at 5 o'clock

The Prizes awarded to successful Candidates in connection with the recent Preliminary and Professional Examinations will be presented by the President at the Annual General Meeting.

BALLOT FOR ELECTION OF COUNCIL.

The following Members were appointed by the Meeting on the 6th May, 1918, to act as Scrutineers of the Ballot for the forthcoming election of a Council for the ensuing year :—

Messrs. J. H. Mellenfield, C. J. Lake, C. S. Burkett-Smith, R. B. Mann, and Geoffrey L. Vigers (Fellows), and H. S. Logsdon (Professional Associate).

PERCIVALL CURREY, *Hon. Secretary.*
A. GODDARD, *Secretary.*

department was quite ready if it received orders. New weights could be issued in exchange for old ones. The manufacture of these new weights could be undertaken by a Government "Mint," or by controlled private enterprise; so also with measures of capacity and lineal measures, but it should be noted that new scales for weighing would not be necessitated by the change.

The Standards Department mentioned would probably be made responsible for carrying out the reform. The work would have to be done expeditiously, effectively and with as little inconvenience to the public as possible. Valuable assistance could be rendered by the Incorporated Society of Inspectors of Weights and Measures, which has its members in all important centres.

I propose that there should be no transition period as generally understood (two years having been usually suggested), with two different systems of weights on the counter at the same time, and an apathy for nearly two years ending with a violent rush to comply with the law at the last moment. Instead I recommend that the change should be made by one trade at a time or by allied trades, and, generally speaking, county by county or district by district. Thus the farmers, corn merchants, millers and bakers within a certain area could all be dealt with together in a few days. Then the butchers on another day, the grocery and allied trades on another, followed quickly by all other trades in food before the coal merchants, ironmongers, &c., were dealt with. It might be found advisable to effect the change with householders first, but I think it would be better to allow each householder to change his weights with the local tradesman (who would be compensated) as he wished, but with a time limit. The borough, urban

district and rural district councils could be called upon to help in the distribution, &c., aided by the police, who formerly tested all the weights and measures in their areas. The work could be further split up by changing weights at one time, measures of capacity at another. Lineal measures would probably best be changed through the local tradespeople, as suggested in the case of the householder. Voluntary workers or others could distribute cards of "practical equivalents" in shops and households.

In particular trades it might be found advisable to make the change throughout the whole country at one time. Thus the draper's yard and tape measures could be altered to the meter and metric tape measures on a given date. For this purpose the Standards Department could consult with the councils of the various trade associations. In the surveyors' profession this Institution, with the aid of the Provincial Committees, could assist in issuing new faces for our levelling staffs, new chains, new tapes, and new boxwood scales in exchange for our old measures, or, if any surveyor did not wish to surrender these, he could purchase new measures. In factories the change could be made as parts were scrapped with a time limit.

Directions could be inserted in the Act or issued by Order in Council as to how and when the reform should be carried out in the Navy, Army, Government departments, and local governing bodies. Drill and other manuals, for instance, would require altering. In cases like royalties and the wages of labour, where the remuneration is based on one of our present units, such as the ton for example, it should be made compulsory to alter to the nearest new unit, and to adjust differences in the remuneration by using fractional parts of a

monetary unit where necessary. Any dispute on this point could be referred to a body set up by the Act, and which, for convenience, I will call the Metric Technical Commission. One of the duties of this body would be to stop passive resistance (if any) to the Act, such as using scientific equivalents where practical equivalents should be used. Thus a pace of 27 inches would become a pace of so many centimeters, and not expressed in millimeters and absurd decimal fractions of millimeters. Such a body too would have power to stop the absurdity of a manufacturer calling the size of a collar 419·1 millimeters (the exact equivalent of $16\frac{1}{2}$ inches) instead of 42 centimeters. It is hardly likely there would be any passive resistance of this nature as it would recoil on the author, but there would probably be cases where a technical body set up by the Act could give a helping hand and a final decision. Thus, by Act 39 & 40 George III., the weight of the bag for hops must not exceed 10 lb. to every 112 lb. In round figures this is 9 per cent., and if this point were not settled in the reforming Act of Parliament, the Commission could be given power to decide that the weight of the bag should not exceed, say, 10 per cent., and so on in similar cases.

Briefly, the tables of equivalents between the International system and our present denominations resolve themselves into (1) practical equivalents, (2) scientific equivalents, and (3) something between these two, which may be termed "abbreviated equivalents."

I fear little will be done as regards organisation until an Act is passed, unless both Houses of Parliament first pass a resolution in favour of making the change. Then, instead of each profession and trade having academic discussions on the merits of their own particular measures

and weights, the merits of the International system, of duodecimals, and so on, their energies would be concentrated upon doing their part to obtain a successful Bill and making suggestions for carrying out the reform.

The Decimal Association would, no doubt, be able to help too with a large staff of lecturers trained in the subject and paid by the Government. It was by similar means the Army trained millions of men in bombing and other subjects. Now is the time for such work, whilst so many are under discipline and receiving instruction by lectures on all kinds of subjects. Most have been living in decimal-using countries, and it is a great mistake to suppose that the working man of this country is too ignorant to understand the system when working men in other countries do understand it.

The Cost.—Several years ago it was estimated that if the Government paid the cost of the reform it would cost only 100 millions sterling. At that time such a sum was thought by some to be impossible; we have now learned to look upon it as the cost of a fortnight of war. It is evident that we could have easily spent the amount. It is no good winning one war in the field and then losing another in commerce. In the above estimate was included the scrapping or altering of certain machinery which turned out articles to be sold by imperial weight or measure. This difficulty could be overcome by selling such articles at per article instead of by weight, but in the meantime our foreign trade would be suffering, as customers *do* prefer the 10 per cent. larger articles. Often have the commercial travellers of our rivals in Europe and in distant climes advertised this fact whilst we slept. There will be other machinery to be altered or scrapped; in some cases it will in any circumstances

have to be scrapped after the war, so now is the time for the Government to declare its intentions with regard to reform. Much machinery is metric already, although described in nearest imperial equivalent. The expenditure would be necessary whatever reform was adopted, but it would all be spent at home, and would be extended over a period. All sorts of schemes are being prepared to find work for our returning soldiers and sailors. Let it be work that will permanently advance us, and the expense of which will cease when completed, as distinct from the creation of works which will mean an annual expense to keep up.

The Measures and Weights of our Forefathers.—For upwards of half a century we have been abandoning or altering nearly all the measures and weights of our forefathers. In these days, and more so in the coming days, we must have up-to-date weapons of commerce, or lose to an up-to-date power or collection of powers who have already made the change and gained ground ever since. It follows they will soon be outstripping us if we do not “wake up,” as our present King once advised us to do.

I have not used the word “compulsory” in this Paper, but it is interesting to note that the Magna Charta was compulsory in respect to measures and weights.

If I have seemed biassed in my arguments, I would point out that I have taken my stand on the following grounds :—

- (1) That the Metric system is international and already largely used in the United Kingdom :
- (2) That the Council of this Institution in 1907 passed a resolution supporting the efforts of

the Decimal Association to bring about the reform ;

- (3) That I do not consider our present units good enough for a commercial conflict ;
- (4) That varied opponents of the International system have for many years combined against it, but no one yet, although repeatedly challenged, has produced in black and white complete tables which they think surpass the International and should replace our own ;
- (5) Consequently, therefore, having before me but one system, namely, the International, the details of which have been fully worked out, and which have been adopted by many nations, the only alternative to remaining as we are is to adopt that system.

There can, in my opinion, be no hesitation as to which course is preferable.

It would have been easier to change years ago, but the war presents a favourable opportunity ; a change will become more and more difficult every year, and then it may come too late. A great responsibility, therefore, rests upon us at the present time. We must not be misled by those who see the necessity for a change but who will not say what it shall be. If it becomes a question of voting on the question, it should be on the principle of an alternative vote. For instance, there may be a proportion at any meeting in favour of no change, or of no common radix, or of no inter-relationship, or who favour, for instance, the inch or mile, or the grain or ton, as the fundamental standard ; or others who would ignore the world's system of

counting and favour a Binary system; while others may wish for a Duodecimal system; and so on *ad infinitum*.

Combined these opponents may seem in the majority, for it is easy to oppose; but it is difficult to elaborate a system which will cover all the essentials as I have called them.

. SUMMARY.

To sum up the whole question of "essentials" of the proposed reform, let us once and for all realise that we must retain the natural horse-load or ton, and that the side of a cube of water weighing 1 horse-load must be the length of a meter or thereabouts. It follows, therefore, that the length of a meter, or thereabouts, must be the fundamental unit from which all other units are derived. Further, common-sense dictates that if we once decide to increase the length of our yard it would be ridiculous to alter it to a length which would be a mere trifle, more or less, than the meter, instead of to the meter itself. Considering that the meter is already to some extent used in the British Isles, we could not have an independent measure of length which would be within, say, 1-8th of an inch of the length of the meter, either way, just because there was a difference of opinion as to what the average horse-load exactly was.

In conclusion let us ask ourselves:—

- (1) Shall we remain as we are?
- (2) Shall we adopt a common radix, or keep the multiplicity of factors as at present?
- (3) Shall the measures and weights be inter-related?
- (4) Shall the radix be 8, 9, 10, or 12

In answer to these questions I would point to the calculating machine.

We can also ask ourselves:—

- (5) Shall we set up a new system for ourselves differing entirely from that of our customers?
- (6) Shall we render useless the teaching of the International system in our schools for many years past?
- (7) Can we ever rid ourselves entirely of the International system? And if not, shall we have two distinct systems of measures and weights in force?
- (8) Shall we let the component parts of the Empire slowly drift further and further away, because we do nothing? Or,
- (9) Shall we take steps to maintain and improve our position and the unity of the Empire, and even to advance the federation of mankind by adopting one language in commerce?

My thanks are due to Messrs. W. F. Stanley & Co., Limited, for lending me the calculating machine, levelling staffs, &c., and to Messrs. W. and T. Avery, Limited, for lending me sample measures and weights.

APPENDIX I.

MULTIPLES OF THE IMPERIAL MEASURES AND WEIGHTS
(as taken from Acts of Parliament) WITH NOTES.*Lineal Measures :—*

Imperial ... 12, 3, $5\frac{1}{2}$, 40, 8; also 1,760 yards to a mile.

Surveyors' ... 7·92 inches to 1 link; 100, 80.

Square Measures :—

Imperial ... 144, 9, $30\frac{1}{4}$, 40, 4, 640.

Surveyors' ... 10,000, 10, 640.

Cubic Measures :—

Imperial ... 1728, 27.

Shipping tonnage (see "Measures of Capacity").

Weights :—

Avoirdupois ... 7,000 (grains to 1 lb.); 16, 16, 14, 2, 4, 112, 20.

Troy ... Troy ounce (based on the avoirdupois lb.), and decimal multiples and submultiples thereof.

Apothecary ... Metric denominations have for years appeared in the British Pharmacopœia.

Jewellery ... The metric carat (as suggested by the author of this Paper).

Shipping tonnage (see "Measures of Capacity").

Measures of Capacity :—

Imperial ... 2, 4, 2, 4, 8; also 36 bushels to the chaldron of coke.

Fish measure (Scotland, &c.). The quarter-cran basket of, say, $9\frac{3}{8}$ gallons (or, say, $42\frac{1}{2}$ liters).

Apothecary ... Metric denominations have for years appeared in the British Pharmacopœia.

Corn ... Statutory "weighed measure" (in most Oversea Dominions corn is sold by weight only).

Shipping tonnage. The unit of "roomage" is 100 cubic feet, and is commonly called register tonnage. It is arrived at by a great number of complicated rules, theoretical and otherwise, except when passing through the Suez Canal, when the tonnage is based on cubic meters of water displaced.

Naval tonnage. Number of tons' weight of sea-water displaced.

The units peculiar to oversea Dominions, to India and to the United States of America, would make the list very much longer.

APPENDIX II.

THE 10 PER CENT. COMPARISON OF CERTAIN BRITISH
AND INTERNATIONAL DENOMINATIONS.

British denomina- tions.	Quantity.	Add 10 per cent.	Approximate International equivalents.	Metric units, less 10 per cent.
Yard ...	36 inches	39·6 inches	1 meter = 39·37 ins.	35·44 inches.
Double or } bi-pound }	2 lb. ...	2·2 lb. ...	1 kilogram = 2·2 lb.	1·98 lb.
Double or } bi-gallon }	2 gallons	2·2 gallons	1 dekaliter = 2·2 lb.	1·98 gallons.

It is convenient to remember the rule of adding or deducting 10 per cent. for rough calculations when converting from British to International denominations, or the reverse.

APPENDIX III.

(A).—WHAT IS MEANT BY A SERIES.

In civilised countries only certain denominations are legal, and may be used, for example, for weighing articles; and those denominations must, if added together, equal the next higher unit.

Thus in avoirdupois weight a 3-lb. weight is illegal, and only weights may be used which are in the series 7, 4, 2, 1. With these we can weigh any number of lb. up to 14, which number of lb. is a unit in itself, namely, the stone. In avoirdupois weight alone there are several different series, namely, for the smaller and larger denominations.

In the International system there is only one series throughout, namely, 5, 2, 2, 1, with which, for example, we can weigh any number of hektograms up to 10, which is a unit in itself, namely, the kilogram. It will be noted that in the International series the denominations are double or half a unit, so we have this advantage, a decimal system with a series which can be used throughout as a Binary series.

To Weigh	We require Weights in lb.	To Weigh	We require Weights in hektograms.
1 lb.	1	1 hg.	1
2 „	2	2 hgs.	2
3 „	2+1	3 „	2+1
4 „	4	4 „	2+2
5 „	4+1	5 „	5
6 „	4+2	6 „	5+1
7 „	7	7 „	5+2
8 „	7+1	8 „	5+2+1
9 „	7+2	9 „	5+2+2
10 „	7+2+1	10 „	5+2+2+1 (or a 1 kg.)
11 „	7+4		
12 „	7+4+1		
13 „	7+4+2		
14 „	7+4+2+1 (or a 14 lb.)		

Thus we find with avoirdupois weight:—

5	out of 14	denominations	require 1 weight	=	about 35·7	per cent.
6	"	14	"	"	2	" = " 42·9 "
3	"	14	"	"	3	" = " 21·4 "

And with International weight we find:—

4	out of 10	denominations	require 1 weight	=	40	per cent.
4	"	10	"	"	2	" = 40 "
2	"	10	"	"	3	" = 20 "

Note.—The percentages are in favour of the International series.

(B).—THE NUMBER 3.

After years of experience no one has complained that 28 or 14 cannot be divided by 3, and yet the principal argument of opponents of the International system is that 10 cannot be divided by 3.

But with either avoirdupois or International weights it is easy to weigh 3 lb. or 3 hektograms respectively. That is the great point. To carry it further:—

One-third of 28 lb. = 9 lb. 5 oz. $5\frac{1}{3}$ drams.

One-third of 1 kilog. = 3·333 h.; and we can carry the decimal right down to milligrams or micrograms far easier than we can convert one-third of a dram to grains.

With either system, for purposes of manufacture, one-third weights are allowed.

In Appendix I. all the imperial gradations are set out; the 3 appears in lineal measures in the 12 and 3 and in the square measure in the 9, and cubic measure in the 27. No 3 or multiple thereof appears in any weights or measures of capacity other than in the 36 bushels to the chaldron of coke, but as no smaller denomination than the chaldron appears, this instance need not be considered.

APPENDIX IV.

BRITISH AND INTERNATIONAL ARITHMETIC.

(A).—This sum is referred to on page 252 of this Paper as having been taken from *The Daily Telegraph*. The question was, “What would 5 tons 11 cwt. 3 qrs. 23 lb. cost at £5 11s. 6d. per ton?”

BRITISH METHOD:—

	£5 11 6	...	price of 1 ton.
	5		
	27 17 6	...	5 tons.
10 cwt. = $\frac{1}{2}$ of 1 ton	2 15 9	...	10 cwt.
1 „ = 1-10th of 10 cwt.	0 5 $6\frac{9}{10}$	...	1 „
2 qrs. = $\frac{1}{2}$ of 1 cwt.	0 2 $9\frac{9}{20}$	...	2 qrs.
1 „ = $\frac{1}{2}$ of 2 qrs.	0 1 $4\frac{9}{40}$	...	1 „
14 lb. = $\frac{1}{2}$ of 1 „	0 0 $8\frac{9}{80}$	...	14 lb.
7 „ = $\frac{1}{2}$ of 14 lb.	0 0 $4\frac{9}{160}$	...	7 „
2 „ = 1-7th of 14 lb.	0 0 $1\frac{9}{800}$	...	2 „
	£31 4 $1\frac{9}{1120}$	5 tons 11 cwt. 3 qrs.	23 lb.

When finished the sum would require checking.

INTERNATIONAL METHOD:—

5.5977 tons at £5.575.

Either a calculating machine could have given the correct answer in 10 seconds by merely turning the handle 22 times, or the sum could be done by logarithmic tables as follows:—

$$\begin{aligned}
 \log. 5.5977 &= 0.7480096 \\
 „ 5.575 &= 0.7462449 \\
 „ 31.207 &= 1.4942545
 \end{aligned}$$

Answer, £31, 2 florins, 7 cents.

Even the latter International method saves 73 figures, 44 words, &c.

(B).—Here is another sum in lineal measurements :—

Deduct either the bottom line from the top, or *vice versa*.
Which is it ?

m.	f.	p.	y.	ft.	in.
1	0	0	0	0	0
0	7	39	5	1	5

APPENDIX V.

(A).—DECIMAL COINAGE.

Whilst feeling it is desirable to aim at all countries having gold coins of similar values, the author personally hopes that other countries will conform to our coinage, if we decimalise it, and also define the weight of our sovereign in International terms (see (B) of this Appendix).

The reasons for this are that the British sovereign has been called the world's monetary unit. It is about the average value of gold coins of foreign countries. Thus the Peru libra is equal; the Egyptian pound, Japanese 10 yen, United States and Canadian 5 dollar, Mexican 5 peso, and the Indo-China 5 piastre are all worth a trifle more than the British sovereign. On the other hand the 25 franc of the Latin Union* and the German 20-mark piece are worth a trifle less.

Similarly we find the small coins of most other countries run from 978 to 1,027 to the British sovereign, and if we coined 1,000 farthings to the sovereign that would be a happy medium. Several countries, too, have coins approximating to the value of our florin.

In any case the simplest mode of initiating a decimal coinage, in the author's opinion, is to keep to our sovereign

* Belgium, Bulgaria, Finland, France and her colonies, Greece, Italy, Roumania, Servia, Spain, and Switzerland.

and florin and coin 100 cents or farthings to the latter. Thus on the *day* the change was made all our coins except the *3d.* piece could continue in circulation as currency (being called in and exchanged gradually), and old copper coins could be exchanged through the banks and tradespeople at 25 pence (or 4-cent. pieces) to the florin as opportunity offered. When once the International system of measures and weights or some other decimal system is installed, and a decimal system of coinage, it would be easy afterwards to alter from one decimal coinage to another if so desired.

In the 1906 edition of my book I suggested that the name *cent.* was preferable to *mil*, because the small coins of foreign countries are generally called cents. (For further particulars see pages 96 to 114 of *Martin's Tables*, now out of print, but a copy of which is in the Library.)

(B).—WEIGHT OF THE SOVEREIGN AND ABOLITION OF TROY WEIGHT.

At present if a foreign customer wishes to compare the value of our sovereign with one of his gold coins, he will, if lucky, eventually be able to find out that 240 troy ounces (each of 480 avoirdupois grains) of standard gold are coined into 934 sovereigns and one half-sovereign (Coinage Act, 1870, First Schedule). Apart from the complexity of the sum required by the definition, he still has to compare the avoirdupois grain with a small weight in his country, or decide to purchase from one of our rivals.

Now many of our sovereigns weigh 8 grams, many just over 8 grams, and many just under. The author, therefore, suggests the weight should be defined as of 8 grams weight when standard. To be exact, when issued, the weight of the sovereign may vary between 8·00101 and 7·97509 grams. The proposal would mean that every sovereign would be worth about 3-8ths of a penny more, or about 3s. more per £100, which could be taken into account by Act of Parliament when repaying loans. So far as the actual coins were concerned, they could still continue in circulation until called in under a Light Coinage Act, but now that so little gold is in circulation, it is evident that the present time is most

favourable to the change, which change would abolish troy weight.

It should be specially noted that any Act of Parliament which abolished troy weight would prove abortive on this point unless it also altered the definition of the weight of the sovereign. The change can be made whether we adopt (1) decimal coinage, or (2) the Metric system generally, or (3) if we adopt neither. Speaking broadly, it is an imperative change in itself.

APPENDIX VI.

OPINION IN INDIA.

BEING TWO EXTRACTS FROM REPORTS TO THE GOVERNMENT OF INDIA ON THE SUBJECT OF A REFORM OF THE MEASURES AND WEIGHTS. A SUGGESTION FOLLOWS.

1. "The people quickly accept changes when ordered, " and in this case the opinion of traders should not be too " much considered, for they may see a benefit to themselves " in a confusion which puzzles the mass of the Indian " people."

2. From the Note prepared, in reply to the Government of India, by Babu Ram Saram Das, M.A., Secretary of the Oudh Commercial Bank: "Let all standard weights and " measures be properly defined by the King. So said Manu, " the great Indian legislator, twelve hundred years before " the birth of Christ."

One can only feel, after thinking of what this far-seeing gentleman has said, that if the Government of India decided to have a new system in India, it would be a popular reform if the bust of the King-Emperor appeared on all the new measures of capacity and weights in the same way as it now appears on the coinage of the India Government. And where a native prince has his own coinage, a similar system might perhaps be adopted by him.

DISCUSSION.

Mr. ARTHUR VERNON (Past-President) said he had great pleasure in proposing that their best thanks be given to Lieut. Martin for the Paper he had read that evening. Lieut. Martin had treated his subject with a skill, interest and learning that had filled them all with admiration.

He believed that by certain Acts of Parliament, in 1847 and 1864, the Metric system was authorised in England, and that a further statute in 1897 legalised the use of the measures of that system; but until the demand for a change became universal, they could understand that the objects of the author's Paper would never be fulfilled. He had treated those objects with some touch of romance, that inseparable from air and water, and he had showed by excellent reasoning that the interests of our country and of the world would be advanced by the adoption of such a system—of course compulsorily. He did not think much difficulty would arise in proving the reader's views to be correct, but the difficulty would be in bringing them into operation, in the upsetting of certain interests, in the cost that would be involved, and in moving Parliament. Parliament moved slowly, except under public pressure and a general call from the nation. It was, he thought, a patriotic duty and advantageous to the Empire to adopt the Metric system, but purely patriotic motives and advantages did not alone, unfortunately, commend themselves to the public. Political parties did not take up questions where votes were not to be gained by doing

so, and he thought there would have to be a great increase in the force of public opinion before the system could be launched.

Anyone who had travelled abroad had found that English money was very difficult to compare with that of other countries using the decimal system. America and France had adopted the latter, and we were told that, practically, every civilised country except our own had adopted it.

He was much struck with the difficulties the author had pointed out in our present system of weights and measures in regard to the sale of agricultural produce. If we could get a man like Mr. Prothero, the President of the Board of Agriculture, to take up the subject (and he might say, in passing, that never had a man filled that post with such conspicuous ability, or held more impartially the balance between landlord and tenant, or possessed a more complete knowledge of every phase of the industry entrusted to his charge), it would give such an impetus and power to the reform that no commission, however important, would prevent it coming into operation.

Personally he thought the Paper they had just heard was a very valuable addition to the *Transactions* of The Institution. It had evidently come from a man with a full knowledge of the subject and enthusiastic in its propagation. He had, therefore, much pleasure in proposing the vote of thanks to Lieut. Martin.

Mr. RICHARD PARRY (Fellow) said he had been greatly interested in Lieut. Martin's Paper. His interest did not arise only from the fact that he had used the decimal system in working out compound interest and valuation tables, but also because, after teaching many

thousands of pupils, he realised that one of his principal difficulties was that of endeavouring to make good the lack of knowledge of mathematics—such as is required in the practice of a surveyor. He considered that a great deal of time was wasted in schools because mathematics was there taught too much from a theoretical point of view. Higher mathematical theories were aimed at—at the expense of, elementary and practical portions of the subject. This was largely caused, no doubt, in this country, by the waste of time necessitated in learning our present complicated system of weights and measures.

There was, he felt sure, no one in the room who would be opposed to the introduction of the Metric system. There were, of course, difficulties to be faced in introducing the system, but these could be overcome as they had been in other countries.

That the Metric system must be adopted there could be no doubt. The only question was—How soon? Surveyors should not block the way. He considered that very much time was wasted in our offices in working out calculations which could be done very quickly by machines. Machinery for office work was used largely in foreign countries, but, excepting in the case of large business firms, it was very little used in Great Britain. He himself used machines in his office for all work that could be done by them, including a calculating machine, one for addressing envelopes, and several others worked by electric motors. Since the outbreak of war he had realised the benefit by using them himself while practically all his staff had joined the Colours.

Surveyors, more than men in many other professions and businesses, were better able to give a lead in bringing about the necessary change in our arithmetic, because

their work was to a large extent mathematical. Civil engineers, chemists, and other professions had adopted the system, and it would be a pity if surveyors did not help.

The principal difficulty would probably be that which would be experienced by the retail tradesman. In the case of a firm of British manufacturing engineers, who were recently carrying out a contract under his firm, he mentioned that the detailed drawings supplied by that firm were all figured in metric units, and that on this, as well as on other occasions, no difficulty was experienced either by himself or the contractors' workmen.

One very important advantage of the system consisted in the inter-relation of weights and measures. It enabled a man to *think* in terms of *specific gravities*. When one knew the cubic contents of any material, one could instinctively obtain an idea of its weight, or obtain such weight exactly by multiplying the cubic contents by the specific gravity of the material.

He gave the answer to Lieut. Martin's sum in Appendix IV., and reminded him that this same sum had appeared in the *Professional Notes* many years ago. He also mentioned the fact that one of his pupils had once suddenly sprung this problem upon him in the course of a lecture on land surveying, and that, although at first sight puzzled with it, he obtained the answer, namely, *one inch*, and was luckily not caught in a trap.

Although no mention had been made in the Paper with respect to the notation to be adopted as to degrees of temperature and of angles, he wished to say he felt sure that the centigrade scale should be adopted for the registration of temperatures, but he would like to hear what Lieut. Martin thought about the abolition of the degree, minute and second for the measurement of angles,

because he believed that most countries which had adopted the Metric system still continued to use degrees instead of grades for the measurement of angles.

He heartily seconded the vote of thanks to Lieut. Martin for his Paper, which had been most interesting to him, and which he considered was a valuable addition to the *Transactions* of The Institution.

Mr. G. CORDEROY (Member of Council) desired to associate himself with the vote of thanks, and to congratulate Lieut. Martin on his most interesting and persuasive Paper. They could all see the value of the inter-relationship of measures of length, area, and capacity and weights, and especially the value of the ready utilisation of specific gravity for the purpose of conversion. What the author of the Paper was advocating was a common mathematical language, or a mathematical Volapuk, throughout the world. While that, no doubt, would be a very useful thing, especially in the British Empire, he was afraid that very much the same sort of difficulties would be encountered in promoting it as were being experienced by the universal language enthusiasts. There were many difficulties and objections to be overcome.

As far as surveyors were concerned, the position adopted by the quantity surveyor in The Institution was summed up in the resolution which was passed by the Quantity Surveyors Committee in January of this year. The Committee, after carefully considering the matter, resolved "That their feeling was that, in a
" matter of such wide-reaching importance, it was rather
" for those most closely concerned, such as the designers,
" the manufacturers, and the producers, to decide whether
" the trade and industry of the country would be bene-

“fited by a change in our methods of weights, measures,
“and coinage, &c., or not. Should, as a result of de-
“tailed careful enquiry, it be decided to adopt either
“the Metric or the decimal system, in the place of that
“now obtaining, as likely to be of advantage to the
“community, the Committee were of opinion that the
“profession would have no difficulty in adapting its
“methods to the change.”

Personally he had never seen the slightest difficulty for any properly qualified surveyor in changing from one system to another. He had for many years used in his own office both the duodecimal and the Metric systems. He entirely agreed that scientifically there was nothing to be said against and everything to be said for the adoption of the Metric system. They were, however, up against various questions of great difficulty, such as standard and sealed patterns, and especially in relation to matters of design. Designers had become used to particular scales. With calculators the case was entirely different. The designer and calculator were in different positions.

In relation to a change of system, perhaps Mr. Martin would be good enough to inform The Institution whether or not it was a fact that mechanical engineers both in England and the United States of America, and the manufacturing trades, were great opponents of the change. They were also faced with the declaration of the Committee on Production and Industrial Policy, which had declared against it. On the other hand the Chambers of Commerce were, through the medium of Lord Southwark, introducing a Bill for the adoption of the decimal system. There was, therefore, no question about the conflict of opinion in this country, and also in America, as to the relative advantages to be derived

from the adoption of the system. There was, however, one thing on which he thought they could all agree, and that was that if ever the Metric system were adopted, it should be put into operation quickly, and that there should be no long period of waiting in effecting the change.

He concluded by saying how much indebted they all were to Lieut. Martin for the trouble he had taken in preparing and presenting his most valuable and interesting Paper.

Mr. F. H. HARDCASTLE asked Lieut. Martin whether he could tell them if scientific men abroad had adopted the metric system in measuring time, and, if so, what did they now use instead of seconds in the unit of energy, *i.e.*, centimeter, gramme, second (the well-known "C. G. S.")?

Mr. E. C. BARTON (Visitor) had much pleasure in congratulating Mr. Martin upon his Paper. It was, indeed, a pleasure to hear it read, for enthusiasts in these subjects were continually being damped in their ardour—those of the metric faith like himself—by such remarks as had just been made by Mr. Corderoy. They were continually being told that the difficulties in the way of a Metric system were too great to be overcome. He thought that was a very unfortunate attitude for a great nation like this to take up. As Lieut. Martin had pointed out, there were times when we did not hesitate to make changes—he forgot how many times exactly—but since 1200 we had been doing nothing else but change weights and measures when we thought fit.

During the last forty or fifty years we had adopted a policy of stagnation, scared by talk of difficulties that did

not exist. Sometimes gentlemen coming from particular departments gave specific cases of such difficulties, which, of course, appealed to them very strongly. For instance, there was a meeting held at The Institution of Civil Engineers at the end of last year, at which a very well known gentleman in the railway world, Mr. Aspinall—an eminent man who would not willingly make a mis-statement—stated distinctly that the trifling item of altering the tare of railway waggons would cost the sum of £400,000, not for the whole railway system in England or the United Kingdom, but for one comparatively small railway company. Mr. Stubbs, who held a high position in the Electrical Engineering Department of the General Post Office, took up the matter and made careful enquiries amongst the railway company offices in London. He discovered that the cost would be practically nil, that is to say, that every railway waggon in this country was brought in approximately within a period of five years to be retared, and the man with his pot of paint and little brush instead of marking those waggons in numbers of tons, hundred-weights, and quarters would simply mark them in kilograms and quintals; and yet they were told that the change would cost £400,000 for one company. Now Mr. Aspinall made that statement believing it to be true, and it was an example of one of those extraordinary cases in which they were frightening themselves into believing there would be trouble and disaster. It was just the same years ago in Parliament when it was proposed to abolish pigtails in the Navy, and when it was gravely announced by an admiral that if this were done the British Empire would fall.

Then in 1905 there was a discussion at the Institute of Electrical Engineers, which was composed of sensible

men, in the course of which it was stated that if the Bill in favour of the Metric system were allowed to go through, they would have to take all the gas pipes out of house walls because they were not upon a metric measure, it being forgotten that the bricks also were not upon metric measure, so that the whole building would have to be pulled down too. Other examples could be given of the way in which people worked themselves up into believing that dreadful things would happen.

Let them compare what really did happen when a small change did take place. He remembered that in Bath, Mr. Dickinson, a jeweller, when a ukase was issued by the Board of Trade or an Act of Parliament that jewellers must use the metric carat, said that it was impossible, that it would take a long time to pick up, and that he feared great mistakes would be made. In one day, however, the change was made—they had practised it a little before—and all the young assistants knew it by nightfall; Mr. Dickinson himself knew it in a week, and after a fortnight declared that he would not go back to the old system for anything. People who were absolutely terrified by the prospect of change found, when it came, that it was quite insignificant.

Another thing to which he wished to draw attention was that the opposition in the engineering profession was very slight. Messrs. Dalby, Walsh & Company sent round some 25,000 circulars of inquiry, and had 90 per cent. back in favour of the decimilisation of weights and measures and coins. The British Engineers' Association sent out a similar one, and they got, he thought, about 80 per cent. in favour of decimal weights and measures, and about 90 per cent. in favour of decimal coinage. *The Electrical Review* also sent out similar inquiries to electricians, and the result there was 90 per cent. in favour

of the new system. He had just been to the north, and was astonished to find the number of engineers who were in favour of it, and, to his intense astonishment, the textile factors were also. In Aberdeen, at Kilgour & Walker's works, they decimalised everything going into the works, and undecimalised everything when it went out again, both as to weights and measures. So he did not think much opposition really existed.

The only other point to which he wished to draw attention at that late hour was that he doubted whether it would be quite wise to make the transition period too short. But if a particular period of, say, five years were allowed then all the young people would be learning it, and the teachers would know they were not teaching the children something that when they went out into the world would be absolutely lost and of no use; but they would teach the system as a living thing, and if once it were implanted in the minds of the young it would make all the difference and be very much easier as far as the older people were concerned.

In conclusion, he might mention that lately he was talking to a gentleman in the corn trade in the Middle West of England, who had told him he had to keep a book of some size and carry it with him simply for the purpose of being able to barter in different towns in England, otherwise it would not be possible for him to know what the real values were from town to town, and that was only for the purpose of transposition. Now, the question was whether all these customary measures would or would not disappear. He might tell them of what had happened in Hanover, where they introduced a new "groschen." For 20 years it failed to oust the old groschen, but the decimal coinage, when introduced, ousted both coins within a couple of years. The Metric

or decimal system had greater power of killing mere customary weights than any other system he knew.

Mr. EDMUND PAGE (Professional Associate) remarked that there was only one small point he would address himself to, although, of course, he desired to be associated with the vote of thanks. If not an impertinence on his part he would like to congratulate Lieut. Martin on having retained his enthusiasm. It must be twelve or fifteen years ago he remembered Lieut. Martin coming into the office where he was employed, and succeeding in convincing his then principal of the advantages of the decimal system. He could safely indulge in the luxury of congratulating Lieut. Martin on being as much interested in the Metric system in 1918 as he was in 1903.

The small point on which he wished to speak was that on page 239 of the Paper. Lieut. Martin used the expression that "our race has developed into a homogeneous " body." A great man, Mr. Chamberlain, once said that we Englishmen should learn to think imperially. Lieut. Martin's Paper had a mathematical, or, at any rate, a quasi-mathematical basis, and he might perhaps give a mathematical illustration of why some people thought that Mr. Chamberlain was both right and wrong. If one asked a mathematician to consider any question which had a variable quantity, he almost always, sooner or later, generally sooner than later, offered for special consideration what was going to happen when one made the variable infinite. So he thought Mr. Chamberlain's point was really one of regarding it as a mathematical problem of politics.

He thought Mr. Chamberlain was right because he

said most of us took too narrow an outlook. Where he thought Mr. Chamberlain was wrong was that he did not carry it far enough. He should have said that we should learn to think, not imperially, but of the whole race; and that was why he was not quite clear whether Lieut. Martin meant that the English nation had developed into a homogeneous body or whether the whole human race had developed into a homogeneous body. It was a trifling point—he was not trying to be captious or critical in making it—but it did occur to him that the Paper might have had for its fundamental basis not the argument that we want this reform so that we could carry on the trade of the country better. It might have said, not that we want reform so that we can compete with other nations, but that we wanted reform so that we could co-operate with other nations. The author did not make that very clear.

Men of standing constantly corrected arguments by comparing them with known or ascertained facts. So that when advocates said the British must have reforms, because with their present hotch-potch they could not compete with the rest of the world, one was naturally inclined to look at the trade returns. What was the good of saying we could not compete with the rest of the world when we were doing it every day—he was not saying we had commercial supremacy—but our trade had been so good that we were able to finance this war very largely alone, or nearly so. Or again, people said we must have this reformed system, otherwise we could not wage war successfully, that we must make our maps and sight our guns on the Metric system. But look at the facts. We were carrying on the war successfully. So that people were saying things which were not good logical propositions when one compared them with the facts. But

if they said that we must have this reformed system so that we could co-operate with other people, it was not quite the same. It stood to reason we could co-operate with another country more successfully if both were using the same system of weights and measures. The language of science had always been international. Newton and Kepler were not opposed to each other because they belonged to different nations, but the fact remained that in scientific text-books they would find a great many things put down in English units which would be better expressed in metric ones.

He thought that science would advance still better if a Metric system were adopted. So all he really wanted to say was to support the proposition in Mr. Martin's Paper, and to suggest another line of argument which might have been taken in addition to those put forth by the reader.

The PRESIDENT, on putting the vote of thanks, said the Paper was to him by far the most interesting they had had this Session. He did not hesitate to say so without disparagement to any other contribution they might have had. He could not imagine anyone arguing that the Metric system is not better than any other. It was merely a question, to his mind, as to how and when it could be carried out in this country. It must be done sooner or later, and he could not help thinking we could not compete with other nations—in spite of what had been said—unless we did adopt the system.

Lieut. A. J. MARTIN, replying, thanked the proposer and seconder for the kind words they had used, and

everyone else present for the patient attention they had given to his Paper. The proposer mentioned that the Metric system was permissive in England previous to the Act of 1897. So that there should be no misconception, he would add that the previous Acts only played with, and unintentionally damaged, the subject, as the system was made permissive for use in contracts only, the invoicing in metric terms having to be in strings of decimals to suit the Imperial equivalents. But the actual measures and weights were not allowed.

Mr. Parry had asked about degrees of temperature and the compass. He (the speaker) had thought it better to keep these questions out of the discussion. The centigrade thermometer was being used more and more by us, but doctors still adhered to the Fahrenheit scale. Perhaps one day they would change just as they had already changed to the International system for their measures and weights.

As to the centesimal division of the compass, we as a Profession use the division of 360 degrees instead of points, quarter-points, &c., as in the Mercantile Marine, and it would not be a long stride from 360 degrees to 400 degrees if we wished.

Mr. Corderoy had said he was afraid we might have to wait as long for one language in commerce as we should for all the world to speak one tongue. In one case, however, it was a question of converting the still unconverted Governments within the British Empire and the United States of America slightly to adjust their measures and weights; in the other case it meant persuading hundreds of races to speak a language other

than their mother tongue—a considerable difference. As to the engineering trades in Britain and the United States of America, nearly all favoured some change, but at present were not unanimous on the International system. He had wished to keep the discussion within the limits of the title of the Paper so far as possible, as they might make a similar mistake to that made by those engineers who objected to the International system on the ground that surveyors could not adopt it for land and their other work. But that that argument was fallacious he trusted the Paper and the discussion had proved.

Reference was also made to the recent report of Lord Balfour's Committee. If time had permitted he would have liked to touch on a number of points in that report, especially as it was by no means unanimous. Many of the arguments he had, however, forestalled, including that advocating the 100lb. (cental) instead of the 112lb. (cwt.); that would be a backward step and detrimental to much of our commerce, as indicated in the Paper. Another question was the cost, which he had dealt with, and he was surprised that in such an important question as this an expenditure of £2,000,000 should be considered by the Committee a large sum, especially as the money would be spent at home. It was idle also to wait for any reform until every retail trader and every customer had expressed a wish for it: that would not be government as he understood the word. The Committee seemed to ignore the fact that Select Committees of the Houses of Parliament had reported in favour of the reform in 1862 and in 1895.

Mr. Hardcastle had enquired if scientific men abroad had adopted the decimal system in measuring time, and, if so, what they now used instead of seconds in the unit of energy—centimeter, gramme, second (the well-known “C. G. S.”); also what was the practice in astronomy. He (Lieut. Martin) believed the C.G.S. system was used abroad as here, and the only decimal division of time and angular degrees of which he was aware was the practice of astronomers, who, for the sake of simplifying their arduous calculations in time and measurements, had decimalised the hour and degree, and certainly were not likely to use only points, quarter-points, &c., of the compass.

Mr. Barton had referred to the difficulty at first in introducing the diamond carat and its present popularity; it had ruined no one, he said. It might interest them to know that one of his books was in 1903 thrown away for advocating a metric carat, but all nations had now adopted it.

Mr. Page had asked the meaning the speaker attached to his words “As our race developed into a homogeneous “body.” By this he had meant when the British race had so developed that it had a central authority once more for dealing with measures and weights instead of the feudal lords setting up their own standards.

He trusted he might be permitted to make a further remark on organisation, namely, that Great Britain could for the purpose be split up into a number of areas so that actually more than one county at a time would be dealt with.

As regards opposition to the International system

generally, he felt sure that history would look upon this in the same way as it now looked upon the opposition to the substitution of Arabic symbols for the old Roman numerals when adding, multiplying or dividing. In again thanking them, he invited an inspection of some Indian weights, all of which he had seen in use, and a casual study of which would demonstrate the confusion existing in India to-day.



HOWARD CHATFEILD CLARKE.

President 1914-15.

THE ANNUAL GENERAL MEETING,

Monday, 27th May, 1918.

ARTHUR LYON RYDE (President) in the Chair.

The Report of the Scrutineers, appointed at the Ordinary General Meeting of Monday, 6th May, 1918, under the provisions of Article XLII. of the By-Laws, was read to the Meeting.

The Report declared that the following were elected a

COUNCIL FOR THE ENSUING YEAR.

President.

JOHN HUBERT OAKLEY.

Vice-Presidents.

ANDREW YOUNG
JOHN WILLMOT

JOSEPH HENRY SABIN
JOHN MCCLARE CLARK

Members of Council.

JAMES INGLIS DAVIDSON
EDWIN SAVILL
EDMUND WALTER RUSH-
WORTH
JOHN DAVID WALLIS
DENDY WATNEY
GEORGE CORDEROY
ERNEST ALFRED RAWLENCE
HERBERT MANSFIELD COBB,
C.B.E.

EDWARD SAMUEL COX
BERNARD MARR JOHNSON
ERNEST HOLTHAM LEEDER
HENRY HARTLEY
CHARLES HERBERT BEDELLS
CHARLES BROWNING FISHER
HARRY FRANKS
FREDERICK HENRY APPLETON
HARDCASTLE

Professional Associates of Council.

STANLEY HICKS.
JOHN MAUGHAN.

Associates of Council.

GEORGE MALLOWS FREEMAN, K.C.
RICHARD FUGE GRANTHAM.

The Report of the Council on the affairs of The Institution and the Statement of Receipts and Expenditure for the year 1917 were read.

IT WAS RESOLVED—"That the Report of the Council and the Balance Sheet be received and approved, and be printed and circulated with the *Transactions*."

IT WAS RESOLVED—"That the thanks of The Institution be given to Messrs. H. C. NEWMARCH and H. S. LOGSDON for the efficient performance of their duties as Auditors, and that they be requested to continue their services for the coming year."

IT WAS RESOLVED—"That the thanks of The Institution are due and be given to the President, Vice-Presidents, and the other Members and Associates of the Council, for the able manner in which they have administered the affairs of The Institution."

IT WAS RESOLVED—"That the thanks of The Institution are due and be given to Mr. ALEXANDER GODDARD (the Secretary), and the other Officers of The Institution, for the able manner in which they have executed their several duties."

IT WAS RESOLVED—"That the thanks of The Institution be given to Messrs. C. J. LAKE, GEOFFREY L. VIGERS, and H. S. LOGSDON, for their services as Scrutineers."

The CHAIRMAN presented the following Prizes won by Candidates in the Professional and Preliminary Examinations, 1918:—

THE "PRELIMINARY" PRIZE OF THE VALUE
OF £2 2s.

for the highest number of marks in the Preliminary Examination, 1918, to CYRIL EDMUND BUTLER, who obtained 403 marks out of 500.

THE "QUANTITIES" PRIZE OF THE VALUE
OF £5 5s.

to WILFRID LEONARD ARMITAGE EVERSLED, who obtained 85 % of the maximum marks in the subject of "Quantities" in the Intermediate Examination, 1918.

THE "CONSTRUCTIVE AND WORKING
DRAWINGS" PRIZE OF THE VALUE OF £5 5s.

to Lieut. THOMAS HAROLD HUGHES, who obtained 74 % of the maximum marks in the subject of "Constructive and Working Drawings."

THE "BEADEL" PRIZE,

BEING THE INTEREST ACCRUING ON THE SUM OF £200, for the best work in the subject of "Agriculture" in the Intermediate Examination, 1918, to HARRY WESTON CARLTON, who obtained 82 % of the maximum marks in this subject.

THE "DRIVER" PRIZE,

BEING THE INTEREST ACCRUING ON A SUM OF £500, for the highest marks gained by a Non-Student Candidate

in the Intermediate Examination, 1918, to DONALD CAMERON, who obtained 802 marks out of 1,000.

He also won

THE "PENFOLD" SILVER MEDAL

for the highest percentage of marks (over 75 % of the maximum) in the Students' and Non-Students' Divisions of the Intermediate Examination, 1918.

THE "CRAWTER" PRIZE,

BEING THE INTEREST ACCRUING ON A SUM OF £200, for the best work in the subject of "Principles and "Practice of Valuation" in the Final Examination, 1918, to CHARLES ANTHONY ASH, who obtained 80 % of his maximum marks in this subject.

THE "PENFOLD" GOLD MEDAL

for the highest marks (over 75 % of the maximum) in the Final Examination, 1918, to ARTHUR FITZSIMMONS, who obtained 805 marks out of 1,000.

Mr. FITZSIMMONS also won

THE "GALSWORTHY" PRIZE,

BEING THE INTEREST ACCRUING ON A SUM OF £500, awarded to the Candidate in the Final Examination who, having passed the Intermediate Examination, while still a student, is found to have obtained the highest number of marks in the two Examinations combined.

THE "MELLERSH" PRIZE,

BEING THE INTEREST ACCRUING ON A SUM OF £100,
for the highest marks in the subject of "Timber
"Valuing and Measuring (Outdoor)" in the Final
Division, to Lieut. JOHN JAMES FLOWER, who obtained
75 % of the maximum marks in this subject.

THE "SCOTTISH" PRIZE, OF THE VALUE OF
£5 5s.

to MURRAY GRANT CAMPBELL, who obtained 756 marks
out of a maximum of 1,000.

A vote of thanks to Mr. RYDE for his conduct
in the chair during his year of office was carried
unanimously.

Mr. OAKLEY, President for the ensuing year, was
inducted to the chair and invested by the retiring
President with the chain of office.

The proceedings then terminated.

THE FIFTIETH
ANNUAL REPORT OF THE COUNCIL.

ANNUAL GENERAL MEETING,
Monday, 27th May, 1918.

The Fiftieth Annual Report of the Council describes the work of The Institution during the fourth year of the great struggle which has involved so large a part of the civilised world, and which has made impossible the Jubilee celebrations, to which in happier circumstances Members would have been looking forward next month. On the 15th June, 1868, The Institution was founded, and the Annual Reports presented since that date will be found to afford a record of public work and consistent professional development and growth which, the Council venture to believe, fully justify the high ideals of those responsible for its birth. Doubtless an opportunity will be taken later of placing before Members a *resumé* of the activities of The Institution during its fifty years of life, but it has been thought best to confine this Report as usual to work of the past Session.

The statistics given in Tables A and B indicate the effect of the war on the membership of The Institution in cutting off the supply of examinees qualifying for

election, who would in ordinary circumstances make good the waste due to war and natural causes. As will be seen later, in the section dealing more particularly with the war, it has been responsible for the loss of 74 Members during the year, and has been most severely felt among the junior classes of membership.

TABLE A.

	Honorary Members.	Fellows.	Colonial Fellows.	Professional Associates.	Associates.	Probationers.	Students.	Total.
May, 1916	23	2013	76	2791	51	63	209	5226
May, 1917	22	1998	81	2656	50	67	140	5014
May, 1918	26	2010	80	2580	47	78	88	4909
	+4	+12	-1	-76	-3	+11	-52	-105

Members will have noted with pleasure the election of three Honorary Members during the Session: The Rt. Hon. Rowland E. Prothero, M.P., C.V.O., President of the Board of Agriculture and Fisheries, to whom the nation is so greatly indebted for his strenuous efforts to increase the home-grown food supply of the country to meet the exceptional calls now made upon it; the Hon. Mr. Justice Arthur Clavell Salter, late Associate Member, on his elevation to the Bench; and Mr. Stanford Edwin Downing, who as secretary of the Ecclesiastical Commissioners represents the landlords of The Institution buildings and one of the largest property-owning bodies in the United Kingdom.

Among those whose deaths the Council have to lament is the late Mr. Howard Chatfeild Clarke, whose early

TABLE B.

	Members (or "Fellows" after 1881).	Associates.		Pro- bationers.	Students.	Total.
		Professional.	Ordinary.			
May, 1869 ...	162		38		2	202
" 1870 ...	180		59		2	241
" 1871 ...	190		65		2	259
" 1872 ...	205		67		4	276
" 1873 ...	225		74		5	304
" 1874 ...	247		89		6	332
" 1875 ...	275		101		11	387
" 1876 ...	300		119		8	427
" 1877 ...	310		133		11	454
" 1878 ...	312		134		8	454
" 1879 ...	330		146		10	486
" 1880 ...	342		155		10	507
" *1881 ...	357		164		14	535
" 1882 ...	480		235		7	722
" 1883 ...	557	218	74		38	887
" 1884 ...	666	307	80		58	1121
" 1885 ...	703	317	86		86	1192
" 1886 ...	716	316	84		80	1196
" 1887 ...	741	339	89		108	1277
" 1888 ...	798	333	90		102	1323
" 1889 ...	910	334	89		110	1443
" 1890 ...	1095	310	89		123	1617
" 1891 ...	1374	336	96		140	1946
" 1892 ...	1646	342	97		172	2268
" 1893 ...	1629	353	93		181	2269
" 1894 ...	1626	381	84		204	2309
" 1895 ...	1629	430	83		210	2352
" 1896 ...	1802	465	86		220	2573
" 1897 ...	1808	540	84		252	2684
" 1898 ...	1835	615	85		272	2807
" 1899 ...	1887	686	84		308	2965
" 1900 ...	1883	757	88		336	3064
" 1901 ...	1883	834	89		364	3170
" 1902 ...	1891	906	86		392	3275
" 1903 ...	1897	1025	86		396	3404
" 1904 ...	1886	1140	80		409	3515
" 1905 ...	1893	1312	80		384	3669
" 1906 ...	1878	1502	74		361	3815
" 1907 ...	1832	1638	74		345	3389
" 1908 ...	1819	1786	77		350	4032
" 1909 ...	1821	1876	76		385	4158
" 1910 ...	1862	1970	75		365	4272
" 1911 ...	1904	2105	73		338	4420
" 1912 ...	1937	2271	62		355	4625
" 1913 ...	1963	2633	61		354	5011
" 1914 ...	2000	2967	57		363	5387
" 1915 ...	2048	2860	53	49	328	5338
" 1916 ...	2013	2791	51	63	209	5127
" 1917 ...	1998	2656	50	67	140	4911
" 1918 ...	2010		47	78	88	4803
Honorary Members ...						26
Colonial Fellows ...						80
1918 Grand Total...						4909

* Since August, 1881, "Members" have been designated "Fellows," and, in 1883, "Associates" were divided into "Ordinary" and "Professional" Associates.

death occurred in July last, at a time when he could ill be spared and when there was reason to hope that he had many years of useful activity before him. It is to be feared that the ungrudging manner in which he devoted his energies to national war work inflicted too great a strain on a constitution which was not strong, and caused the final breakdown which we so greatly deplore. As a Member of Council since 1903, and President in the first year of the war, he had given an immense amount of time to The Institution, and to his exertions is due the substantial War Fund which has proved of such value in assisting Members who have suffered financially through the war.

Since this Report was drafted the deaths of two other prominent Members have occurred; that of Mr. Percivall Currey, for fourteen years the active and courteous Honorary Secretary of The Institution, on the 20th May; and that of Mr. Fredk. George Chinnock, Member of Council from 1905 to 1915, four days later. The loss of two Members to whom The Institution owed so much within a few days of the Annual Meeting cannot fail to sadden those who are present at the reading of this Report.

Apart from those who have died in the service of their country, and whose names will be found recorded later, the Council have regretfully to report the severance of long-standing ties with The Institution in the deaths of the following Members elected in or before the eighties: F. G. Galsworthy, London, 1868, Member of Council 1890 to 1903; Sir John Wolfe Barry, London, 1868, Associate of Council 1885 to 1918; Frederick Chancellor, Chelmsford, 1870; C. H. Shoppee, London, 1877; W. H. Lock, Instow, 1881; A. T. Draper, Leicester, 1882; T. E. Newton, Winchester, 1883; E. Greenop, London, 1884; F. D. Holiday, Bicester, 1884; A. W. F.

Eade, Darlington, 1885; H. Brailsford, Derby, 1887; L. R. S. Walcott, London, 1887; W. B. Canning, Salisbury, 1887, for many years an active member of the Benevolent Fund Committee; J. B. Abbey, Huddersfield, 1889; G. Smith, Boughton-Monchelsea, 1889; and G. P. Stewart, Dublin, 1889.

FINANCE.

The main feature of the year under this heading of our Report has been the continued effect of the war on the finances of The Institution. This has shown itself in a further drop of a little over £600 in the value of capital investments, and a decrease of £777 in income from subscriptions. Economy of expenditure, however, together with the lapse of Mr. Julian Rogers' pension on his death in May last, enabled the Auditors again to congratulate the Council and Members on the soundness of The Institution's financial position.

It will be remembered that in their Report for 1916-17 the Council referred to the arrangement they had made with their bankers for the taking up of the newly issued 1917 5 per cent. War Loan. The amount of the loan from the Bank now outstanding is £3,750.

TABLE C.

RECEIPTS.				PAYMENTS.			
	£	s.	d.		£	s.	d.
Revenue Balance—				Total Payments out of			
1st January, 1917	1,709	4	1	Revenue (Current Ex-			
Total Receipts on Re-				penses)	8,048	19	7
venue	9,606	3	3	Purchase of £5,000 4s.			
Capital Account	232	1	0	1d. War 5% Inscribed			
Loan from Bankers	4,750	0	0	Stock	4,750	3	11
				Examinations Account	224	18	4
				Part Repayment of Loan			
				from Bankers	1,000	0	0
				Petty Cash in hands of			
				Secretary	50	0	0
				Cash at Bankers on			
				Current Account	2,223	6	6
	£16,297	8	4		£16,297	8	4

THE EXAMINATIONS.

Further concessions have been made to meet the case of candidates who have been prevented by military service from following the ordinary examination course. This takes at least two years to complete under the existing rule requiring candidates to pass both the Intermediate and Final Examinations before qualifying for election as Professional Associates. A special single examination has been introduced, covering both the Intermediate and Final, for the use of candidates who have served in the naval or military forces, thus enabling them to qualify for election in one year ; while the needs of those who have already passed the Intermediate, but have been prevented from sitting for the Final, have been met by reverting in such cases to the rule which obtained up to the end of 1913, and permitted candidates to come up for election as Professional Associates as soon as they had successfully passed the Intermediate.

Minor concessions have been made in allowing candidates to sit for the Intermediate at $17\frac{1}{2}$ years of age, *i.e.*, before attaining military age ; by holding a second typical subject examination in July, so that those who fail in that subject only may have an opportunity of qualifying without waiting another year ; by holding certain of the professional examinations, where no outdoor work is required, in Manchester as well as in London, Glasgow, and Dublin, thus saving considerable expense to candidates ; and by arranging for the examination of military candidates to take place abroad under proper supervision.

It is hoped that these concessions, in conjunction with those already reported, may do something to prevent unnecessary delay in completing the examination

qualifications of those whose professional training has been interrupted by their country's call.

A small, but useful, alteration in the syllabus of subjects has been made in allowing candidates in Sub-Division II. of the Final Examination the option of taking the Development of Building Estates instead of Outdoor Forestry, the latter subject being of less value to those engaged in purely urban practice.

Table D, showing the number of candidates who sat for the Preliminary and Professional Examinations, again indicates the effect of the Military Service Acts, 32 candidates having presented themselves for the Preliminary, the smallest number since 1882, and 53 for the Professional, to compare with which we have to look back to 1886.

In the Typical Subjects only 6 candidates sat, 4 of whom were successful.

The number of examinees sitting at Glasgow was 6, of whom 2 entered for the Intermediate, 2 for the Final, and 2 for their Typical Subject only; 1 candidate was referred back in his Typical Subject, the other 5 satisfying the examiners.

At the examination held in Dublin, 2 candidates in the Final Division presented themselves, 1 of whom satisfied the examiners.

TABLE D.

Years.	Preliminary Examinations.			Professional Examinations.		
	Candidates.	Passed.	Percentage.	Candidates.	Passed.	Percentage.
1881	13	6	46·15	2	1	50·00
1882	30	17	56·66	—	—	—
1883	44	22	50·00	25	22	88·00
1884	51	30	58·82	36	23	63·89
1885	46	37	80·43	43	31	72·09
1886	46	34	78·26	56	38	67·85
1887	53	39	73·58	58	45	77·59
1888	48	39	81·25	73	52	71·23
1889	51	41	80·39	71	51	71·83
1890	53	44	83·01	96	70	72·91
1891	76	60	78·94	92	68	73·91
1892	83	64	77·10	125	93	74·40
1893	77	57	74·00	149	100	67·11
1894	97	66	68·00	182	129	70·87
1895	121	80	66·11	196	141	71·93
1896	117	78	68·37	212	143	67·45
1897	133	91	68·42	236	151	63·97
1898	127	95	74·80	265	169	63·77
1899	145	112	77·25	290	184	63·44
1900	131	102	77·86	325	193	59·38
1901	142	111	78·45	362	246	67·95
1902	165	133	80·06	369	241	65·30
1903	151	108	71·52	424	294	69·34
1904	152	108	71·05	480	370	77·08
1905	132	88	66·66	505	399	79·00
1906	190	106	55·78	535	349	65·23
1907	171	102	59·64	554	422	76·17
1908	160	106	66·25	468	351	75·00
1909	137	95	69·34	540	356	65·93
1910	130	95	73·08	623	437	70·14
1911	137	92	67·15	768	516	67·18
1912	121	78	64·46	1,102	738	68·76
1913	146	93	63·69	1,266	724	57·19
1914	145	100	68·96	1,095	670	61·19
1915	84	61	72·61	526	290	55·13
1916	44	32	72·72	140	80	57·15
1917	34	26	76·47	73	52	71·23
1918	32	24	75·00	53	40	75·47
TOTALS	3,815	2,672	70·00	12,415	8,279	66·68

TABLE E.

England and Wales.

	Sub-Division I. Land Agency			Sub-Division II. Valuation.			Sub-Division III. Building and Quantities.			Sub-Division IV. Mining.			Percentage of Candidates who Passed.
	Examined.	Passed.	Referred Back in Typical Subject.	Examined.	Passed.	Referred Back in Typical Subject.	Examined.	Passed.	Referred Back in Typical Subject.	Examined.	Passed.	Referred Back in Typical Subject.	
Intermediate Examination, Students	1	1	—	—	—	—	1	—	1	1	—	—	33·33
Intermediate Examination, Non-Students	2	1	—	2	1	—	4	3	1	—	—	—	62·50
Final Examination	4	4	—	8	6	1	7	6	—	1	1	—	85·00
Direct Fellowship Examination	—	—	—	—	—	—	5	4	0	—	—	—	80·00
Special Examination	—	—	—	1	1	—	2	2	—	—	—	—	100·00
Totals	7	6	—	11	8	1	19	15	2	2	1	—	76·92

THE EXAMINERS.

The following is a list of those who acted as examiners in the recent examinations. The warmest thanks of all

Members of The Institution are due to them for their services.

MR. J. E. BIDWELL.	MR. F. J. LLOYD.
MR. THOMAS BINNIE.	MR. W. MCCrackEN
MR. G. T. BROWN.	MR. R. B. MANN.
MR. E. F. BUCKLEY.	MR. JAMES MATHER.
MR. J. W. WILLIS BUND, C.B.E.	MR. J. D. MATHEWS.
MR. J. BURY.	MR. P. T. MAW.
MR. C. CHART.	MR. W. MENZIES.
MR. A. B. CLIFF.	MR. R. E. MIDDLETON.
MR. ROBERT COBB.	MR. H. P. MONCKTON.
MR. DONALD CURRIE.	MR. E. C. P. MONSON.
MR. J. J. DONE.	MR. E. J. NALDRETT.
MR. J. E. DROWER.	MR. T. A. O'DONAHUE.
MR. JAMES EDGAR.	MR. E. C. PINKS.
MR. W. H. EVE.	MR. R. G. G. REED.
MR. WILLIAM FRASER.	MR. K. ROBINSON.
MR. GORDON T. FREW.	MR. W. G. S. ROLLESTON.
MR. H. FREYBERG.	MR. E. SAVILL, O.B.E.
MR. G. B. GARVEY.	MR. W. T. SCRUBY.
MR. J. GILCHRIST.	MR. SYDNEY A. SMITH.
MR. J. GRIMWOOD.	MR. S. L. THACKER.
MR. M. L. GWYER.	MR. GILBERT THOMSON.
MR. F. H. A. HARDCASTLE.	MR. D. T. THRING.
MR. T. W. A. HAYWARD.	MR. A. VERNON.
MR. EUSTACE HILLS.	MR. H. T. WALES.
MR. F. HUDESTON.	MR. ALEXANDER WALKER.
MR. JOHN HUME.	MR. A. T. WALMSLEY.
MR. F. W. HUNT.	MR. DENDY WATNEY.
PROFESSOR JACKSON.	MR. J. WILSON.
MR. W. J. JEEVES.	MR. M. H. YOUNG.
MR. H. J. JOHNSON.	

The only change from last year is that Mr. W. J. Jeeves, Associate, has kindly taken the place of Mr. J. L. Crouch, Associate, in the subject of Dilapidations, the latter being engaged in war work. It is with the greatest regret that the Council have to report the death of Lieut. Commander J. Dawbarn Young, R.N.V.R., Associate (who acted as examiner until prevented from doing so by his naval duties) in the gallant attack on St. George's Day on the Zeebrugge harbour defences.

THE PUBLICATIONS.

Apart from the President's Address, the following Papers have been read at Ordinary General Meetings during the Session : "Agricultural Executive Committees "and their Work," by Mr. Harold V. Raffety, O.B.E. (Fellow); "The Employment in the Surveyors' Profession "of Men disabled in the War," by Mr. L. G. Pilkington, Y.M.C.A.; "The Taxation, Rating, and Valuation of "Mines," by Capt. David Bowen, R.E., F.G.S., M.I.M.E., &c. (Fellow); "The Cost of Building before and after "the War," by Mr. E. H. Selby; and "The Metric System "and its Relation to the Surveyors' Profession," by Lieut. A. J. Martin (Fellow).

Important Reports have also been published on Mine Rents and Royalties, and on Housing, the latter having been widely circulated outside The Institution, in response to a demand which arose in many quarters from public bodies, societies and individuals interested in the subject. A Memorandum supplementary to the Housing Report, and directed to secure the co-operation of private enterprise in the anticipated housing programme, will be found in the April, 1918, issue of the *Professional Notes*.

THE STANDING AND SPECIAL COMMITTEES.

Apart from the ordinary work of the Standing Committees, a list of which will be found at the end of this Report, a large amount of work has been undertaken by Special Committees, on which a number of Members, in addition to Members of Council, have served. The Council desire to express their appreciation of the valuable services they have rendered to The Institution.

During the year the Military Board of Enquiry into applications for exemption from military service has sat on 40 occasions, and has investigated a large number of cases. The regular manner in which applications for exemption have been referred to it for reports by the Military and Appeal Tribunals is proof that it has filled a useful part, and that the impartiality with which it has carried out its difficult duty is recognised by the authorities.

Apart from this Board, probably the heaviest work of the Session has fallen upon the Housing Committee, which, in addition to the Report and Memorandum, to which reference has already been made, has presented Reports on Compounding and the Direct Payment of Rates, and on the Increase of Rent, &c. (Amendment) Act, 1918, which have been forwarded by the Council to the proper authorities.

The Mining Committee has been responsible for the Report on Mine Rents and Royalties already mentioned, and for a Memorandum on the Petroleum Production Bill, which was introduced in the House of Commons, but afterwards withdrawn, the matter being dealt with as a temporary measure by regulation under the Defence of the Realm Acts.

The Quantity Surveyors' Committee has continued to urge upon the Government departments concerned the importance of quantities being provided in respect of the many permanent and semi-permanent buildings erected for war purposes, if economy is to be secured and ground for friction and misunderstanding with contractors is to be avoided.

Special Committees have also dealt with subjects such as the increase in the value of tithe rent-charge and the upkeep of agricultural estates; the effect on food

production of notices to quit for the purpose of the sale of agricultural land, in connection with which a deputation was received by Mr. Prothero, the President of the Board of Agriculture and Fisheries, in April; and the employment in or by the profession of discharged and disabled soldiers, the Committee dealing with which is still sitting.

THE PROVINCIAL COMMITTEES.

The following list of the Provincial Committees shows the Chairmen, Secretaries and number of Members in each.

TABLE F.

Committee.	Chairman.	Hon. Secretary.	Number of Members
Northumberland and Durham	Geo. T. Brown	C. McGhie	101
Cumberland and Westmorland	F. B. Punchard	T. Brown, Jun.	37
Lancashire and Cheshire ...	H. Swetenham	J. H. Hall	320
Yorkshire	John Watson	R. E. Horsfall	235
Salop and Hereford and Mid-Wales	W. T. Hall	A. M. Hickman	52
Nottingham, Lincoln, and North Derby	W. H. Pain	E. J. Turton	102
South Wales and Monmouth	E. H. Leeder	F. H. G. Osmond-Smith	149
Warwick, Worcester, Stafford, and South Derby	John Willmot	E. G. Bigwood	217
Leicester, Northampton, and Rutland	C. B. Fisher	M. T. Woolley	65
Cambridge, Huntingdon, Norfolk, and Suffolk	Henry Donne	L. G. Hawkins	132
Berks, Bucks, and Oxon ...	H. D. Buckland	M. C. Duchesne	92
Beds, Essex, Herts, and Middlesex	Chas. P. Hall	A. W. Merry	288
Devon and Cornwall ...	J. A. Lucas	J. F. Bowden	100
Somerset, Glo'ster, and North Wilts	J. J. Harle	A. E. Petter	139
Hants, Dorset, and South Wilts	Ernest Fox	R. C. Barrow	203
Kent	Henry Dann	R. Cobb	187
Surrey	Charles Osenton	C. F. Slater	216
Sussex	H. G. B. Wyatt	H. G. B. Wyatt	125
North Wales	W. E. Jones	J. M. Porter	34
Irish Committee	Fane Vernon	B. J. Newcombe	160
Scottish Committee	J. I. Davidson	W. Fraser	227

The Council had hoped to arrange a number of meetings in the provinces on the occasion of The Institution Jubilee, to enable the President and Council to meet Members in their own districts, and to discuss with them matters of interest in connection with The Institution and the profession. The passing of the Man Power Act in April, and the national crisis which necessitated it, made such a series of meetings out of the question, and the Council were reluctantly obliged to abandon the proposal. They hope, however, that at a more propitious season the idea may be revived, and an opportunity afforded them of meeting their fellow-Members and celebrating the fiftieth year of The Institution's existence.

The work which has fallen upon Members practising in the provinces, especially in connection with food production, has been heavy, and the Council wish to record their appreciation of the national services which have been rendered in this direction, as well as their indebtedness to the Provincial Chairmen and Secretaries for their assistance in carrying on the ordinary work of The Institution.

THE EUROPEAN WAR.

The demands made by the war upon the young life of The Institution has been proportionate to the national sacrifice. Since their last Report 74 Members have been killed in action or have died on military service from wounds or other causes, the total number of those who have suffered now amounting to 225.

The following are the names of those who have been added to the lengthening Roll of Honour during the year :—

ROLL OF HONOUR.

Name.	Rank and Regiment.	Previous Position.
R. G. ANDERSON (P.A.) ...	Lieut. Royal Glos. Hussars	Valuation Dept., Inland Revenue
H. E. ARTHUR (P.A.) ...	Pte., 12 Bn. London Regt. Rangers	Messrs. Farebrother, Ellis & Co., London.
F. E. V. BANCE (P.A.)...	Pte., 2nd London Regt., Royal Fusiliers	Valuation Dept., Inland Revenue.
R. H. BARCLAY (P.A.)...	L.-Corpl. London Regt.	
A. E. BARE, M.V.O. (F.) ...	Capt., 28th London Regt.	Partner in Messrs. Bare, Leaning & Bare, Lond.
MAURICE BOTTING (Student)...	Pte., 15th London Regt.	Valuation Dept., Inland Revenue.
C. V. BOULTON (P.A.) ...	2nd Lieut., R.E. ...	Borough Surveyor's Office, Wandsworth.
B. A. BOYTON (F.) ...	Lieut., R.F.A. ...	In private practice.
H. H. BRADSHAW (P.A.) ...	2nd Lieut., R.E. ...	Borough Surveyor's Office, Rochdale.
H. C. BRIERLEY (F.) ...	Capt., Manchester Regt.	City Surveyor's Office, Manchester.
J. S. CHADBAND (P.A.) ...	Pte., Royal Fusiliers...	Valuation Dept., Inland Revenue.
H. H. COOK (P.A.) ...	2nd Lieut., R.E. ...	Messrs. Farber, London.
J. T. COOK (P.A.) ...	Gunner, R.G.A. ...	
F. M. CRASTON (Student) ...	2nd Lieut., F. Lancs. Regt.	Articled to Mr. E. A. Hepworth, Manchester.
G. F. DEANE (P.A.) ...	Lieut., R.E. ...	
C. H. DINWIDDY (F.) ..	Capt., R.G.A....	Messrs. T. Dinwiddy & Sons, London.
E. J. DODD (P.A.) ...	2nd Lieut., R.F.A. ...	Valuation Dept., Inland Revenue.
E. H. DODGSON (P.A.) ...	Sapper, R.E. ...	
H. H. DONGRAY (Student) ...	2nd Lieut., M.G.C. ...	Articled to Mr. Harold E. Moore, London.
CHARLES DREWETT (Examinee)	2nd Lieut., E. Yorks Regt.	Valuation Dept., Inland Revenue.
HAROLD EATON (P.A.) ...	2nd Lieut. Glos. Regt.	Valuation Dept., Inland Revenue.
C. E. ELLIS (P.A.) ...	2nd Lieut. H.A.C. ...	Messrs. R. Ellis & Sons, London.
R. D. ELLIS (P.A.) ...	Capt., Lincs. Regt. ...	Valuation Dept., Inland Revenue.
T. H. FOGG (F.)...	Lieut., R.E. ...	In private practice.

ROLL OF HONOUR—(continued).

Name.	Rank and Regiment.	Previous Position.
F. O. FORRESTER, M.C. (Student)	Lieut., R.N.V.R. ..	Messrs. Bowditch & Grant, Croydon.
F. A. FOWLER (P.A.)	Capt., R.G.A.... ..	Messrs. Fowler & Fowler, Norwood.
R. G. GALE (Examinee)	Lieut., Gloucester Regt.	Nuneham Courtenay Estate Office.
F. GOLDSMITH, M.C. (Student)	Major, Hampsh. Regt.	Messrs. Hall, Pain & Goldsmith, Petersfield.
COLIN GORDON (Examinee) ...	Capt., London Regt....	Wye College, Kent.
F. G. GRAVES (Student)	2nd Lieut., Notts and Derby Regt., Sherwood Foresters	Articled to Mr. Harold E. Moore, London.
H. GREENHALGH (Examinee)... ..		Valuation Dept., Inland Revenue.
D. M. GRIFFIN (Examinee)	Lieut.	Mr. Henry Hartley Liverpool.
E. C. GRIPPER (P.A.)	Capt., K. O. Yorkshire Light Infantry	
SYDNEY HALL (P.A.)	Capt., R.G.A.... ..	Valuation Dept., Inland Revenue.
E. W. F. HAMMOND, M.C. (P.A.)	Capt., H.A.C.	Mr. Leslie Raymond, Golder's Green.
HAROLD HANSON (F.)	Capt., West Riding Regt.	Messrs. Abbey & Hanson, Huddersfield.
R. W. HAYBITTLE (P.A.)	Lieut., Cheshire Regt., attached M.G.C.	Valuation Dept., Inland Revenue.
C. A. G. HODGSON (P.A.)	Capt., Royal North Devon Hussars	Stratfield Saye Estate Office.
V. W. HOLLIS, M.C. (P.A.)	2nd Lieut., R.F.A.	Valuation Dept., Inland Revenue.
A. T. HOUSDEN (P.A.)... ..	28th London Regt., Artists' Rifles	Messrs. Bowditch & Grant, Croydon.
W. H. HOWATT (F.)	2nd Lieut., Scottish Rifles	Messrs. W. Howatt & Sons, Glasgow.
STEPHEN JALLAND (Examinee)		Mr. H. R. Moiser, York.
F. J. D. KNOWLING, M.C. (Examinee)	Capt., Argyll & Sutherland Highlanders	Harper Adams Agricultural College.
N. P. LAIRD, D.C.M. (F.)	2nd Lieut., K.O. Scottish Borderers	Westcotes Estate Office, Leicester.
T. S. LATHAM (F.)	Lieut., R.F.A.	Marylebone Borough Council.
F. S. LLOYD (Examinee)		Messrs. Knight, Frank & Rutley, London.
G. T. LOBAN (F.)	Capt., R.F.C.	Valuation Dept., Inland Revenue.
A. McDOWALL (P.A.)	2nd Lieut., East Lancs. Regt., attchd. R.F.C.	Mr. G. A. McDowall, Plaistow.
J. S. MORRISON (Examinee) ...	Lance-Corpl. Highland Light Infantry	Valuation Dept., Inland Revenue

ROLL OF HONOUR—(continued).

Name.	Rank and Regiment.	Previous Position.
J. W. MORRISON (P.A.) ...	Lieut., R.N.D. ...	War Office.
H. C. NUTTER (P.A.) ...	Capt., Sussex Regt. ...	Messrs. Rutter, Sons & Co., Cambridge.
G. N. E. PENTELOW (Student)...	Co.-Sgt.-Major, South Staffs. Regt.	Messrs. F. Hazell & Co., London.
L. J. PICKRELL (Student) ...	2nd Lieut., R.F.A. ...	Articled to Mr. Cuthbert Lake, London.
H. H. PRICE (P.A.) ...	Oxon and Bucks L.I.	Valuation Dept., Inland Revenue.
C. F. J. RICHARDSON (P.A.) ...	Lieut., R.E. ...	In private practice.
C. B. ROBERTSON (P.A.) ...	2nd Lieut., R.F.A. ...	Factor on Faskally Estate, Pitlochry.
J. T. RYDE (P.A.) ...	2nd Lieut., Bedfordshire Regt.	Messrs. Ryde & Sons, London.
LESLIE SCOTT (P.A.) ...	Lieut., Household Bn. (Capt., R. Sussex Regt.)	In private practice.
G. T. SEARING (P.A.) ...	Sapper, Royal Engineers	Messrs. Prall & Prall, Dartford.
F. W. SIMMONS (P.A.)...	Capt., Hampshire Regt.	Messrs. Simmons & Sons, Basingstoke.
J. SLATER (P.A.) ...	2nd Lieut., Lancs. Fusiliers	Mr. E. C. Pinks, London.
G. F. SOGNO (P.A.) ...	2nd Lieut., Royal Sussex Regt.	Messrs. E. Watson & Son, Heathfield.
A. D. STEWART (P.A.)...	Lieut., R.F.C. ...	Valuation Dept., Inland Revenue.
E. D. SYMES, M.C. (P.A.) ...	Capt., London Regt....	Messrs. Lambert & Symes, Paddock Wood.
A. C. R. TATE (Student) ...	Lieut., R.A.F. ...	Mr. J. J. Tate, Skipton-in-Craven.
W. O. THOMAS (P.A.) ...		Ramsden Estate Office.
A. H. TUCKER (P.A.) ...	Lieut., Royal Sussex Regt., attachd. K.R.R.	In private practice.
C. G. VICKERS (P.A.) ...	Capt., Yorks. and Lancs. Regt.	Messrs. A. Smith Denton & Co., Sheffield.
E. A. WALKER (Probationer)...	West Riding Field Co., R.E.	In private practice.
W. C. G. WARNE (Student) ...	Sapper, 478th South Midland Co., R.E.	Kingswood U.D.C. Surveyor's Office.
C. H. C. WELLINGS (P.A.) ...	2nd Lieut., Labour Co.	Mr. A. T. Wellings, London.
FELIX WYATT (Examinee) ...	Capt., Suffolk Regt. and R.F.C.	Valuation Dept., Inland Revenue.
H. H. WIGLEY (F.) ...	Lieut., Royal Lancs. Regt.	Messrs. Geo. Wigley & Sons, Winslow.
J. D. YOUNG (Associate) ...	Lieut.-Cdr., R.N.V.R.	Barrister-at-Law.

Members will join with the Council in offering their deepest expression of sympathy to the families of these brave men.

In addition to those mentioned in the above list, the Council heard with regret that a member of the staff, 2nd Lieut. Gerald King, was reported missing after the great attack on the Somme in Easter week, and that Battalion Sergt.-Major Bird, of the Hall staff, who had previously distinguished himself by obtaining the Military Medal, was severely wounded in the same battle. They have since learnt that Lieut. King is a prisoner of war, and that Sergt.-Major Bird has been awarded the Distinguished Conduct Medal.

The number of military distinctions obtained by Members during the year must prove very satisfactory to the profession. Since the last Report the following honours are known to have been obtained, and it is probable that, owing to the difficulty of keeping in touch with Members under service conditions, the list is incomplete: One C.B. (Military), one C.M.G., four D.S.O.s, two Bars to M.C., forty-three M.C.s.; five Foreign Distinctions—L'Ordre de Leopold of Belgium, the Silver Medal of the Crown of Italy, the Silver Cross of the Italian Order of St. Lawrence, and the Russian Orders of St. Anne and St. Stanislaus (Third Class).

The following non-military honours awarded by His Majesty for war work of various kinds have also been obtained by Members: Companion of Honour, one; Knights, two; K.B.E.s, two; C.B.E.s, five; O.B.E.s, seven; M.B.E.s, six; C.V.O., one.

MISCELLANEOUS.

Apart from the matters already referred to, The Institution, either through individual Members or through its Committees, has taken its share in other public work.

Mr. George F. Stewart, our first Irish President, was a member of the Irish Convention, and has since been placed upon the Currency Committee appointed by the Treasury and the Ministry of Reconstruction. Other Members have served upon or appeared as witnesses before the Agricultural Policy, Forestry, and Acquisition of Land Sub-Committees of the Ministry of Reconstruction; the Housing and Building Material Committees of the Local Government Board; the Housing (Private Enterprise) Committee of the Ministry of Reconstruction; the Food Control Committee; The Air Raids Surveyors' Advisory Committee set up by the Home Secretary and Chief Commissioner of Police; the Agricultural Advisory Committee to the Ministry of National Service; the War Risks Insurance Committee; the National Agricultural Council; and the Committee enquiring into the Fire-Resisting Properties of Reinforced Concrete; besides a number of unofficial enquiries and committees dealing with war and after-war matters.

In December last a deputation representing The Institution was received at the Local Government Board for the purpose of urging in person the views contained in the Housing Report and Memorandum already referred to. A further Report by the Housing Committee, formulating a scheme for bringing home to indirect ratepayers their responsibility for the increase of local burdens, was adopted by the Council and presented to the Local Government Board. Representa-

tives of The Institution have also taken an active part in the Housing Conference organised by the Royal Institute of British Architects.

A Memorandum drawing attention to certain objections attending the procedure adopted by the Defence of the Realm Royal (Losses) Commission in connection with property occupied for war purposes was also prepared, and placed before the Commission by a deputation. The Treasury has since been approached on the subject. Copies of the Memorandum, the Shorthand Notes of the deputation, and the communication to the Treasury will be found in the April, 1918, issue of the *Professional Notes*. The Council also impressed upon the Chancellor of the Exchequer and the Treasury the inconvenience attaching to the payment of income tax Schedule A in one sum, which, with the rate at 5s. in the £, takes up a whole quarter's rent. They suggested that the precedent of the other schedules should be followed and payment allowed in two instalments. Members will have noted with satisfaction that the Council's proposal was adopted in the last Budget.

The War Risks Insurance Committee was approached on the subject of surveyors' fees in connection with the reinstatement of property damaged in air raids under the Government insurance scheme, which, it will be remembered, the Committee when first constituted refused to recognise. Although no minimum fee is laid down to meet the requirements of cases where the damage sustained is small, it is at least satisfactory to know that professional fees are now allowed at the rate of 5 per cent. where plans are required, with $2\frac{1}{2}$ per cent. additional for quantities in larger cases, and $2\frac{1}{2}$ per cent. where no plans, but only advice and supervision, are necessary.

The Council have been pleased to co-operate with a Committee of the Board of Education for providing books of a technical nature to enable British prisoners of war to study their professions while interned abroad. A number of duplicate copies of works likely to be useful for this purpose has been presented to the Committee from the Library.

In view of the necessity of restricting the length of their Report to meet the war requirements, it has been impossible to refer to all The Institution activities during the year, but the Council trust that enough has been said to show that the responsibilities and duties entrusted to them have been efficiently performed.

ADDENDUM.

In view of the small number of candidates who presented themselves for the professional examinations, the examiners have not, as a rule, found it possible to draw any general conclusions on the work done. It has, therefore, been decided not to issue the usual *précis* of the examiners' reports.

LIST OF STANDING COMMITTEES FOR THE
SESSION 1917-18.

BUILDING.	COUNCIL SELECTION.	COUNTY DISTRICTS AND COUNTRY MEETINGS.
Bedells, C. H.	Bidwell, C.	Dann, H.
Corderoy, G.	Brain, Sir Francis	Fisher, C. B.
Freyberg, H.	Hanson, J. H.	Hall, W. T.
Johnson, B. Marr	Martin, H.	Hanson, J. H.
Martin, Howard	Oakley, J. H.	Martin, H.
Stenning, Sir A.	Rolleston, Sir J.	Pain, W. H.
Vernon, A.	Sabin, J. H.	Rawlence, E. A.
Watney, Daniel	Stenning, Sir A.	Stewart, G. F.
Watney, Dendy	Stewart, G. F.	Strutt, Hon. E. G.
Ryde, A. L.	Strutt, Hon. E. G.	Watney, Daniel
Currey, P.	Vernon, A.	Wyatt, H. G. B.
	Vigers, L. R.	Ryde, A. L.
	Wallis, J. D.	Currey, P.
	Watney, Daniel	
	Willmot, John	
	Young, A.	
	Ryde, A. L.	
	Currey, P.	

LIST OF STANDING COMMITTEES—(continued).

DINNER.

Bidwell, C.
 Martin, H.
 Watney, Daniel
 Ryde, A. L.
 Currey, P.

Jones, Thomas
 Leeder, E. H.
 Martin, H.
 Oakley, J. H.
 Sabin, J. H.
 Savill, E., O.B.E.
 Stenning, Sir A.
 Strutt, Hon. E. G.
 Vigers, L. R.
 Wallis, J. D.
 Willmot, J.
 Ryde, A. L.
 Currey, P.

Wood, L. S.
 Young, A.
 Ryde, A. L.
 Currey, P.

EDUCATION.

Brown, W. Forster
 Clark, J. M.
 Corderoy, G.
 Cox, E. S.
 Davidson, J. I.
 Fisher, C. B.
 Fox, Ernest
 Freyberg, H.
 Hanson, J. H.
 Hartley, H.
 Horne, W. E., M.P.
 Leeder, E. H.
 Martin, H.
 Oakley, J. H.
 Sabin, J. H.
 Vernon, A.
 Vigers, L. R.
 Wallis, J. D.
 Young, A.
 Ryde, A. L.
 Currey, P.

FINANCE.

Horne, W. E., M.P.
 Jones, Thomas
 Martin, H.
 Rolleston, Sir J.
 Rushworth, E. W.
 Sabin, J. H.
 Strutt, Hon. E. G.
 Ryde, A. L.
 Currey, P.

FORESTRY.

Bidwell, C.
 Cobb, H. M., C.B.E.
 Cox, E. S.
 Duchesne, M. C.
 Fisher, C. B.
 Maughan, J.
 Oakley, J. H.
 Rawlence, E. A.
 Rolleston, Sir J.
 Savill, E., O.B.E.
 Somerville, Dr. W.
 Strutt, Hon. E. G.
 Watney, Daniel

LIBRARY AND
SESSIONAL PAPERS.

Bedells, C. H.
 Martin, H.
 O'Donahue, T. A.
 Rushworth, E. W.
 Sabin, J. H.
 Savill, E., O.B.E.
 Vigers, L. R.
 Watney, Daniel
 Watney, Dendy
 Young, A.
 Ryde, A. L.
 Currey, P.

MINING SURVEYORS.

Armstrong, H.
 Brain, Sir F. W. T.
 Brown, W. Forster
 Childe, H. S.
 Forster, T. E.
 Geddes, C. D.
 Greaves, P. C.
 Hanson, J. H.
 Jones, Thomas
 Leech, A. H.
 Lewis, Col. G. A., C.M.G.
 Martin, H.
 O'Donahue, T. A.
 Redmayne, Sir R.
 Turner, D. N.
 Wales, H. T.
 Wallis, J. D.
 Wallwork, J.
 Willmot, J.

ELECTIONS.

Cox, E. S.
 Davidson, J. I.
 Hanson, J. H.
 Hartley, H.
 Hicks, Stanley

LIST OF STANDING COMMITTEES—(*continued*).PARLIAMENTARY BILLS
AND GENERAL
PURPOSES.

Bedells, C. H.
 Bidwell, C.
 Clark, J. M.
 Cobb, H. M., C.B.E.
 Corderoy, G.
 Cox, E. S.
 Dann, H.
 Davidson, J. I.
 Fisher, C. B.
 Freeman, G. M., K.C.
 Horne, W. E., M.P.
 Hanson, J. H.
 Hartley, H.
 Johnson, B. M.
 Leeder, E. H.
 Lewis, Col. G. A., C.M.G.
 Martin, H.
 Maughan, J.
 Oakley, J. H.
 Osenton, Charles
 Punchard, F. B.
 Rawlence, E. A.
 Rushworth, E. W.
 Sabin, J. H.
 Savill, E., O.B.E.
 Stenning, Sir A.

Strutt, Hon. E. G.
 Vigers, L. R.
 Wainwright, T. T.
 Wallis, J. D.
 Watney, Dendy
 Willmot, J.
 Young, A.
 Ryde, A. L.
 Currey, P.

PROFESSIONAL
PRACTICE.

Bedells, C. H.
 Clark, J. M.
 Cobb, H. M., C.B.E.
 Corderoy, G.
 Davidson, J. I.
 Fox, Ernest
 Geddes, C. D.
 Hanson, J. H.
 Hartley, H.
 Hicks, S.
 Horne, W. E., M.P.
 Johnson, B. M.
 Leeder, E. H.
 Martin, H.
 Oakley, J. H.

Osenton, C.
 Rushworth, E. W.
 Sabin, J. H.
 Savill, E., O.B.E.
 Slater, C. F.
 Stenning, Sir A.
 Vigers, L. R.
 Watney, Daniel
 Watney, Dendy
 Willmot, J.
 Young, A.
 Ryde, A. L.
 Currey, P.

QUANTITY SURVEYORS.

Brown, W. B.
 Corderoy, G.
 Drower, J. E.
 Glead, R. C.
 Hardcastle, F. H. A.
 Hurrell, J. W.
 Kenwick, G.
 Lawrence, W.
 Mann, R. B.
 Paull, Alan
 Trollope, C. G. N.
 Watson, John (Hull)
 Young, M. H.

Holders of Special Diplomas form Sections, acting as Committees, for the purpose of advising the Council upon matters coming within their respective provinces.

1917.		ASSETS.		BALANCE SHEET,					
				£	s.	d.	£	s.	d.
Cash at Bankers and in hands of Secretary :—									
Current Account (including £50 Petty Cash)		...	...	2,273	6	6			
Library, Forestry, and Geological Account		...	...	414	8	4			
"Prize Endowment" Capital Account		...	...	0	14	9			
"Prize Endowment" Income Account		...	...	130	16	0			
							2,819	5	7
Furniture		...	...	...	...	...	1,394	7	
Library, Forestry, and Geological Account		...	...	...	...	...	3,407	19	8
INVESTMENTS :—									
The Leasehold Premises (999 years from 1893)									
No. 11, Great George Street, S.W., at cost		...	...				20,230	19	8
£	s.	d.							
7,095	16	9	War 5% Inscribed Stock at 93 $\frac{3}{8}$	...	6,643	9	7		
3,399	4	4	New South Wales 3% Inscribed Stock						
			at 69	...	2,345	9	2		
3,314	18	7	India 3% Stock at 54 $\frac{1}{4}$	...	1,798	7	0		
1,811	1	11	New South Wales 4% Inscribed Stock						
			at 78 $\frac{1}{2}$	...	1,421	14	2		
1,240	3	1	Metropolitan Water Board 3% B Stock						
			at 60	...	744	1	10		
1,000	0	0	6% Exchequer Bonds at 101 $\frac{3}{8}$	...	1,016	5	0		
							13,969	6	9
<i>Library, Forestry, and Geological Account.</i>									
£	s.	d.							
2,055	9	5	War 5% Inscribed Stock at 93 $\frac{3}{8}$	...	1,924	8	8		
401	16	9	West Australian Government 4% Inscribed Stock at 78 $\frac{1}{2}$	...	315	8	10		
							2,239	17	6
<i>Prize Endowment Account.</i>									
£	s.	d.							
503	1	11	India 3% Stock at 54 $\frac{1}{4}$	...	272	18	7		
278	0	3	Midland Railway 2 $\frac{1}{2}$ % Debenture Stock						
			at 50	...	139	0	1		
254	0	0	North British Railway 4% No. 1 Preference Stock at 71 $\frac{1}{2}$	...	181	12	2		
426	0	0	War 5% Inscribed Stock at 93 $\frac{3}{8}$	...	398	16	10		
440	10	8	India 3 $\frac{1}{2}$ % Stock at 63 $\frac{1}{4}$	...	278	12	9		
500	0	0	Courage & Co. 3 $\frac{1}{2}$ % B Debenture Stock	...	285	0	0		
							1,556	0	5
<i>Scholarship Account.</i>									
£	s.	d.							
2,922	13	10	War 5% Inscribed Stock at 93 $\frac{3}{8}$	...	2,736	7	5		
1,988	1	7	Metropolitan Water Board 3% B Stock						
			at 60	...	1,192	16	11		
1,813	3	0	Queensland 4% Inscribed Stock (1940-50) at 79 $\frac{1}{2}$	...	1,441	9	1		
2,324	14	0	New Zealand 4% Inscribed Stock (1943-63) at 81	...	1,883	0	2		
							7,253	13	7
<i>Penfold Scholarship Account.</i>									
£	s.	d.							
1,600	0	0	Canadian Pacific Railway 4% Debenture Stock at 79*	...					
							1,264	0	0
Amounts due, but not received at date, viz. :—									
Subscriptions and Entrance Fees		...	...	1,066	16	0			
Hire of Rooms		...	...	11	0	6			
Rent of Offices (Tribunal of Appeal)		...	...	33	5	0			
Rent of No. 11, Great George Street		...	...	225	0	0			
							1,336	1	6

* Deposited with the Treasury under Scheme B.

£55,471 12 3

31st DECEMBER, 1917.

LIABILITIES.

1917.

	£	s.	d.
Accumulations Account	34,395	0	9
Library, Forestry, and Geological Account	6,062	5	6
"Prize Endowment" Capital Account	1,556	15	2
"Prize Endowment" Income Account	130	16	0
Scholarship Account—General	7,253	13	7
" " " " " Penfold "	1,264	0	0
Sundry Creditors, Due to	1,059	1	3
Loan from Bankers	3,750	0	0

We report that with the assistance of the Chartered Accountant we have examined the foregoing Accounts, and have obtained all the information and explanations that we have required; and in our opinion such Accounts are correct. The foregoing Balance Sheet is properly drawn up so as to exhibit the true and correct state of The Institution according to the best of our information and the explanations given to us and as shown by the books of The Institution.

H. C. NEWMARCH,

H. STEWART LOGSDON,

Auditors.

16th March, 1918.

We have examined the receipts and payments affecting the Accounts for the year ended December 31st, 1917, and find the same in good order and vouched. We have also examined the Deeds and Securities, and certify that they were in possession and safe custody as on 31st December, 1917.

TANSLEY WITT & CO.

5, Chancery Lane, London, W.C. 2.

16th March, 1918.

£55,471 12 3

RECEIPTS.

FOR THE YEAR ENDED

		£	s.	d.	£	s.	d.	£	s.	d.
17.	To Cash at Bankers on Current Account ...							659	4	1
1st.	„ Do. do. on Deposit ...							1,000	0	0
	„ Petty Cash in hands of Secretary ...							50	0	0
INCOME ACCOUNT :—										
31st.	To 1,579 Fellows' Subscriptions at £3 3s.	4,973	17	0						
	„ 55 Fellows' Subscriptions, Arrears at £3 3s. ...	173	5	0						
	„ 30 Fellows' Subscriptions in advance for 1918 at £3 3s. ...	94	10	0						
	„ 9 Fellows' Subscriptions on reinstatement at £3 3s. ...	28	7	0						
	„ 15 Differences of Subscription on Transfer at £1 1s. ...	15	15	0						
					5,285	14	0			
	„ 1,069 Professional Associates' Subscriptions at £2 2s. ...	2,244	18	0						
	„ 151 Professional Associates' Subscriptions, Arrears at £2 2s. ...	317	2	0						
	„ 11 Professional Associates' Subscriptions in advance for 1918 at £2 2s. ...	23	2	0						
	„ 5 Professional Associates' Subscriptions on reinstatement at £2 2s. ...	10	10	0				2,595	12	0
	„ 33 Students' Subscriptions at £1 1s. ...	34	13	0						
	„ 3 Students' Subscriptions in advance for 1918 at £1 1s. ...	3	3	0						
								37	16	0
	„ 35 Probationers' Fees at £1 1s. ...							36	15	0
	„ Hire of Rooms ...							297	13	6
	„ Referees' Decisions ...							3	7	0
	„ Dividends and Interest ...							560	9	7
	„ Rent of Leasehold Property, No. 11, Great George Street, S.W. ...	675	0	0						
	„ Less Ground Rent on the same ...	247	10	0						
								427	10	0
	„ Loan from Bankers ...							9,244	17	1
	„ Conversion of £1,990 17s. 4d. War Loan 4½ % Stock ...									
								1,990	17	4
								6,740	17	4
SCHOLARSHIP ACCOUNT :—										
	To Dividends ...							361	6	2
	„ Conversion of £2,776 11s. 6d. War Loan 4½ % Stock ...							2,776	11	6
								3,137	17	8
CAPITAL ACCOUNT :—										
	To 19 Fellows' Entrance Fees at £5 5s. ...	99	15	0						
	„ 30 Fellows' Differences of Entrance Fee at £2 2s. ...	63	0	0						
								162	15	0
	„ 22 Professional Associates' Entrance Fees at £3 3s. ...							69	6	0
								232	1	0
								£21,064	17	2

31st DECEMBER, 1917.

PAYMENTS.

1917. Dec. 31st.		£	s.	d.	£	s.	d.	£	s.	d.
By Reports on Unemployment after the War					92	1	7			
„ <i>Transactions</i> : Reporting and Publication					258	8	9			
„ <i>Professional Notes</i> : Reporting and Publication					245	15	2			
„ Salaries and Pensions					2,547	9	9			
„ Wages and Pension					334	4	10			
„ Postage and Receipt Stamps, General...	125	12	10							
„ „ „ „ <i>Transactions</i>	88	8	9							
„ „ „ „ <i>Professional Notes</i>	39	14	8							
„ „ „ „ <i>Unemployment Reports</i>	25	10	2							
					279	6	5			
„ Rates, Taxes, Corporation Duty, and Insurance	1,923	1	0							
„ Staff Endowment Insurance	272	4	2							
					2,195	5	2			
„ Fuel, Light, and Water					314	1	1			
„ Ground Rent, <i>less</i> Tax	787	12	6							
<i>Less</i> Amount received from the Tribunal of Appeal	120	0	0							
					667	12	6			
„ Stationery and Books of Account					79	18	0			
„ Repairs					1	19	6			
„ Printing and Lithography					242	3	1			
„ Parliamentary Papers					35	10	11			
„ Provincial Committees					434	4	2			
„ Housekeeper's Account and Sundries					302	11	11			
„ Donations for Professional Objects					15	10	0			
„ Public Trustee Guarantees					2	16	9			
								8,048	19	7
„ Purchase of £5,000 4s. 1d. War 5 % Stock at 95					4,750	3	11			
„ Do. do. £2,095 12s. 8d. War 5 % Stock at 95, by conversion					1,990	17	4			
								6,741	1	3
„ Part Repayment of Loan from Bankers								1,000	0	0
EXAMINATIONS :—										
By Examiners' Fees, Hire of Hall, &c.					419	13	9			
<i>Less</i> Candidates' Examination Fees	180	2	0							
„ Sale of Syllabus	14	13	5							
					194	15	5			
								224	18	4
SCHOLARSHIP ACCOUNT :—										
By Purchase of £2,922 13s. 10d. War 5 % Stock at 95, by conversion								2,776	11	6
„ Petty Cash in hands of Secretary								50	0	0
„ Cash at Bankers on Current Account								2,223	6	6

£21,064 17 2

LIBRARY, FORESTRY, AND

1917.		£	s.	d.	£	s.	d.
Dec. 31st.	To Purchase of Books, Maps, &c. :—						
	General Library	10	9	3			
	Loan Library	9	10	6			
					19	19	9
	„ Amount of Depreciation written off ...				276	6	5
	„ Annual Subscriptions :—						
	British Fire Prevention Committee ...	2	2	0			
	London Society	1	1	0			
	Topographical Society	1	1	0			
					4	4	0
	„ Honorarium to Curator				52	10	0
	„ Printing and Stationery				14	12	10
	„ Insurance				4	14	0
	„ Contribution to Irish Branch Library ...				26	5	0
	„ Portrait				5	14	0
	„ Purchase of £2,055 9s. 5d. War 5 % In-						
	scribed Stock, by conversion ...				1,952	14	2
	„ Balance carried forward to 1918 :—						
	Cash at Bankers	414	8	4			
	£2,055 9s. 5d. War Loan 5 % Inscribed						
	Stock at 93½	1,924	8	8			
	£401 16s. 9d. West Australian Govern-						
	ment 4% Inscribed Stock at 78½ ...	315	8	10			
	Value of Books, Forestry, and						
	Geological Collection	3,407	19	8			
					6,062	5	6
					£8,419	5	8

CAPITAL ACCUMULATIONS

1917.		£	s.	d.
Dec. 31st.	To Balance brought from Examinations Account			
	(Deficit 1917)	224	18	4
	„ Decrease in Value of Investments	228	10	5
	„ Depreciation on Furniture	73	7	9
	„ Decrease in Outstanding Accounts	164	11	9
	„ Increase in Liabilities	166	18	5
	„ Balance carried forward to 1918	34,395	0	9
		£35,253	7	5

GEOLOGICAL ACCOUNT.

1917.				£	s.	d.
Jan. 1st.	By Balance brought forward from 1916	...	...	6,308	13	6
Dec. 31st.	,, Increased Values at this date:—					
	Books purchased	...	...	19	19	9
	Books presented	...	...	9	0	9
	,, Dividends	...	...	111	10	6
	,, Donations	...	...	12	12	0
	,, Increased Value of Investments	...	...	4	15	0
	,, Conversion of £1,952 14s. 2d. 4½ % War Stock	...	...	1,952	14	2

£8,419 5 8

ACCOUNT.

1917.				£	s.	d.
Jan. 1st.	By Balance brought forward from 1916	...	...	33,464	2	9
	,, Balance brought forward from Receipts and Payments (Capital)	...	...	232	1	0
	,, Balance brought forward from Receipts and Payments (Income)	...	...	1,557	3	8

£35,253 7 5

"PRIZE ENDOWMENTS"

1917.	£	s.	d.	£	s.	d.
Dec. 31st. To Decrease in Value of Investments ...				52	8	2
„ Conversion of £304 14s. 1d. War Loan						
4½ % Stock				304	14	1
„ Conversion of £100 5 % Exchequer						
Bonds				100	0	0
„ Balance carried forward to 1918, viz. :—						
“Penfold Gift”—						
£503 1s. 11d. India 3 % Stock at 54¼	272	18	7			
“Beadel Bequest”—						
£278 0s. 3d. Midland Railway 2½ %						
Debenture Stock at 50	139	0	1			
“Crawter Bequest”—						
£254 North British Railway No. 1						
Preference Stock at 71½	181	12	2			
“Watney Gift”—						
£320 14s. 9d. War Loan 5 % Inscribed						
Stock at 93⅞	300	5	10			
“Mellersh Bequest”—						
£105 5s. 3d. War Loan 5 % Inscribed						
Stock at 93⅞	98	11	0			
“Driver Bequest”—						
£440 10s. 8d. India 3½ % Stock at 63¼	278	12	9			
“Galsworthy Gift”—						
£500 Courage & Co. 3½ % B Debenture						
Stock at 57	285	0	0			
Cash in hand	0	14	9			
				1,556	15	2
				£2,013	17	5

"PRIZE ENDOWMENTS"

1917.	£	s.	d.	£	s.	d.
Dec. 31st. To Paid for “Beadel Prize”	5	1	6			
„ Paid for “Driver Prize”	12	0	0			
„ Paid for “Crawter Prize”	9	18	9			
„ Paid for “Penfold Prize”	16	3	0			
„ Paid for “Galsworthy Prize”	14	1	10			
„ Paid for “Mellersh Prize”	4	0	0			
				61	5	1
„ Balance carried forward to 1918... ..				130	16	0

 £192 1 1

CAPITAL ACCOUNT.

1917.		£	s.	d.
Jan. 1st.	By Balance brought forward from 1916 (including 14s. 9d. cash balance)	1,609	3	4
	„ Purchase of £320 14s. 9d. War 5 % Inscribed Stock, by conversion	304	14	1
	„ Purchase of £105 5s. 3d. War 5 % Inscribed Stock, by conversion	100	0	0

£2,013 17 5

INCOME ACCOUNT.

1917.		£	s.	d.	£	s.	d.
Jan. 1st.	By Balance brought forward from 1916 ...				115	11	0
Dec. 31st.	„ Dividends as under :—						
	“ Beadel ” Bequest	5	4	4			
	“ Driver ” Bequest	11	11	4			
	“ Crawter ” Bequest	7	12	4			
	“ Mellersh ” Bequest	4	11	1			
	“ Penfold ” Gift	11	6	4			
	“ Watney ” Gift	15	10	5			
	“ Galsworthy ” Gift	13	2	6			
					68	18	4
	„ Excess of Expenditure carried to General Prize Account				7	11	9
					£192	1	1

APPENDIX TO VOL. L.

Obituary.

SIR JOHN WOLFE BARRY, K.C.B., although best known as one of the famous engineers of last century, had been connected with The Institution as an Associate Member since its foundation in 1868, and as Associate of Council since 1885. Although of late years the many demands upon his time made his attendance at the meetings of the Council less frequent, he continued to take an interest in the work of The Institution, and was always ready to advise on subjects upon which his wide experience and sound judgment qualified him to speak with authority.

It is unnecessary to refer here to his work as an engineer beyond saying that his name was known in connection with railway and bridge construction in almost every part of the world, but mention must be made of the valuable movement he originated in the establishment of the British Engineering Standards Committee, which now covers the whole range of engineering practice, and touches that of the building surveyor at many points.

Sir JOHN was a generous supporter of Westminster and other charities, and acted as chairman of the Westminster Hospital up to the day of the illness which led to his death.

GEORGE BLENCOWE (Fellow), who died at his residence, Abbey Hill, Bury St. Edmunds, in November

last at the age of 75, was known far and wide in East Anglia. He was sole principal of the firm of Messrs. Biddell & Blencowe of Bury St. Edmunds, which was founded upwards of a century ago by the late Mr. George Biddell, who was a great-uncle of Mr. BLENCOWE. The latter joined the business as a partner of William Biddell, for some time Parliamentary Member for West Suffolk, and maintained his active association with it until the time of his death.

Mr. BLENCOWE's authority on agricultural matters and the soundness of his judgment on questions of value were widely recognised. He had been a Fellow of The Institution since 1891.

HENRY BRAILSFORD (Fellow), whose death occurred in September last in his 83rd year, was the agent for thirty-three years of the Kedleston estates of Baron Scarsdale. Under his management the estates were raised to a state of great productivity, and he gained the high esteem of both landlord and tenants, his practical knowledge of agriculture being utilised to the greatest advantage. Just prior to retiring from his post with Lord Scarsdale, the tenants and others on the estate marked their appreciation of his services by presenting him with an illuminated address.

Mr. BRAILSFORD was also for nearly sixty years steward of the Barlborough Hall (Hatfield) and Anthorpe estates of Mr. and Mrs. Locker-Lampson, and for many years managed the estates of Mr. G. E. Kinnersley. He had been a Fellow of The Institution since 1888.

WILLIAM BROWNE CANNING (Fellow), whose death took place on October 18th, at Salisbury, in his 70th year, was a member of a well-known Wiltshire

family long connected with agriculture in that county. He joined the firm of Messrs. Rawlence & Squarey of Salisbury and Westminster in 1884, and his expert knowledge of agriculture caused his services as an agricultural valuer to be in great request. His firm was concerned in the acquisition by the War Office of land on Salisbury Plain for the training of troops, and he later acted as War Department land agent.

Mr. CANNING had been a Member of The Institution since 1887, and in 1908 served as chairman of the Hants, Dorset and South Wilts Provincial Committee. He had long interested himself in the benevolent work of The Institution, being a member of the Benevolent Fund Committee, of which he was a generous supporter, at the time of his death.

FREDERICK CHANCELLOR (Fellow) served his articles with a City architect, and also studied at the Royal Institute of British Architects, of which he became a Fellow. In 1846 he entered the office of the late Mr. James Beadel, and twelve years later commenced practice as an architect and surveyor in London and Chelmsford. He was a devoted antiquary and founded the Essex Archæological Society. He was first mayor of Chelmsford, which office he filled on seven occasions; he was also a member of the Essex County Council, and a past-master of the Coachmakers' Company.

Mr. CHANCELLOR was one of the oldest Members of The Surveyors' Institution, having been a Fellow since 1870. He died in January last at the age of 92.

FREDERICK GEORGE CHINNOCK (Fellow), whose death occurred at the end of May, had for many years occupied a foremost position in the profession.

Articled to Mr. Albert Buck of Worcester, an original Member and Past-President of The Institution, Mr. CHINNOCK there gained that thorough knowledge of country work, and that love of rural life, which always distinguished him. The early death of his father, with whom he had just entered into partnership, threw the responsibility of conducting a large London business to a great extent on the young man's shoulders, and what must at first have seemed an overwhelming misfortune proved to be the opposite by bringing out to the full the energy and self-reliance inherent in his character. Handsome in appearance and of an attractive manner he made many friends, and with the generosity characteristic of the surveyor's profession these rallied to his assistance, and their advice and support were readily placed at his disposal during the first difficult years.

Soon, however, young CHINNOCK showed that he was capable of taking his own place in the profession, and until his retirement from business in 1913 his firm, Messrs. Chinnock, Galsworthy & Chinnock, were concerned in many of the largest sales of landed estates effected in England. Among the more important of these may be mentioned the Swinton Castle estate, Masham, 22,000 acres, sold in 1882 for nearly half a million sterling; the Jervaulx Abbey and Whalton estates of the Marquis of Ailesbury, 43,000 acres, making upwards of a million; the Thorpe Perron estate near Bedale of 10,000 acres, which made a quarter of a million; and, perhaps best known of all, although the sale was not completed, the Savernake estate of 40,000 acres to Lord Iveagh for about one million sterling.

The soundness of Mr. CHINNOCK's judgment of the value of both urban and rural property soon made itself recognised, and resulted in his advice being largely

sought in mortgage valuations, while later he became a familiar figure in the arbitration room.

He was one of the earliest Members of The Institution, being elected in July, 1868, and his official number being fifty-seven; and on his partner, Mr. Galsworthy, retiring from the Council in 1904, Mr. CHINNOCK was elected to take his place. In 1912 he was asked to allow his name to be put forward for election as a Vice-President, with the object of his attaining in time the highest position, but to the great regret of his colleagues, who recognised his worth and how well fitted he was to fill the presidential chair, he felt compelled to decline on the ground of advancing years and lessening strength. The following year he resigned his seat on the Council, inflicting upon himself a generous self-imposed fine of £100, by which the Benevolent Fund of The Institution benefited.

The above will afford some indication of the position which FRED CHINNOCK, as he was known to a wide circle of friends, made for himself in his profession, but it was those who knew him in his own beautiful home at Crookham, Hants, the hospitable, courteous, English country gentleman, who saw him at his best. A keen sportsman, he was well known with the Garth, Vine, South Berks and H. H. Hounds, while almost up to the last he could hold his own with younger men in the covert or the field.

HOWARD CHATFEILD CLARKE (Past-President) died in July last, at the early age of 57, after a long and trying illness, the result of overwork. It would be difficult to overestimate the loss sustained by The Institution in that announcement. No one among the

younger generation of surveyors had more truly identified himself with The Institution and its work and the ideals which animated its founders. Born in 1860, HOWARD CHATFEILD CLARKE was educated at Brighton and at Clifton College, and received his professional training in the office of his father, Mr. Thomas Chatfeild Clarke, who preceded his son as President of The Institution in 1894.

As a youth he was not over-robust, a circumstance which doubtless impressed its influence upon his after life, as to gain strength he travelled widely in Australia, Switzerland, Italy, and other countries, before definitely settling down to his profession. The breadth of outlook and freedom from any suspicion of insularity or narrowness, which were so characteristic of him, were doubtless to some extent due to this early training. He was elected a Professional Associate of The Institution in 1884, and was transferred to the Fellowship two years later, having in the meantime been taken into partnership by his father.

Young CHATFEILD CLARKE quickly made his mark in his profession, both as an architect and as an authority on light and air and party-wall cases, and later as a valuer and arbitrator whose opinions and decisions carried the greatest weight. He was a frequent speaker on professional subjects in the Lecture Hall of The Institution, and was the author of several Papers read at Institution Meetings, the last being his Presidential Address in November, 1914, which aroused more than local interest, and was widely read and quoted in professional and political circles. His year of office as President coincided with the first year of the war, and the interest and generous support he had always given to the Benevolent Fund of The Institution led him to

initiate the collection of the War Fund, which has proved of so great a value in providing assistance for Members who have been called to the Colours, or who have otherwise suffered financially through the war.

HOWARD CHATFEILD CLARKE was responsible for many buildings in the City and West End of London, but he will perhaps best be remembered architecturally for the well-planned Cordwainers' Hall in the City, and the Gresham School at Holt, Norfolk, which was erected for the Fishmongers' Company from his designs.

It was, however, as a surveyor, rather than as an architect, that he became most prominent. His soundness of judgment, his absolute integrity and freedom from prejudice, and his judicial temperament soon made themselves recognised and led to his services being continually in demand in the arbitration room, so that of late years few cases of importance came up for decision without CHATFEILD CLARKE being called upon to take a foremost part either as arbitrator or umpire. Besides the official position he held as surveyor to the Cordwainers' and Fishmongers' Companies, he acted for the London Tilbury and Southend Railway Company, the Midland Railway Company, the General Mutual Life Assurance Association, the Scottish Union of National Insurance Companies, and other leading insurance and banking associations. Always ready to devote himself to public work, he had, up to the time of his breakdown in health, acted as honorary adviser to the Ministry of Munitions, travelling all over Great Britain for the purpose of settling disputes or advising as to valuations in connection with industrial and other works required for war purposes. It is to be feared that the overwork thus freely undertaken proved too much for a constitution which was never over-strong, and cut short a career

when the very highest honours of the profession were within his grasp.

He married the second daughter of the late Mr. J. J. Galt of Fernhill Park, Isle of Wight, and left three sons and three daughters. One of the former is serving with the Artillery, while it is a pathetic incident that the last few weeks of his life were saddened by the news that his second son, who had a commission in the South Wales Borderers, was reported missing.

Even after a lapse of ten months it is not easy for one who had enjoyed CHATFIELD CLARKE'S friendship, and had come under the influence of his attractive personality, to speak of him without, perhaps, some appearance of exaggeration. But this memoir would be incomplete without some reference to the character which made for him so many friends, and those who knew him best will agree that it would be difficult to speak in too high terms of the courtesy, geniality, unselfishness, and thought for others which always distinguished him.

Perhaps his character may best be described by the term "thorough." The thoroughness of his friendship, of his work, of his effort after all that was highest and best, was patent to everyone who had relations with him, whether business or social; and to this was added a lack of self-consciousness or of any form of smallness or pettiness, the whole going to form a personality which will long be remembered with affection.

JOHN CLARKSON (Fellow) was educated at Bedford School, where he obtained an Exhibition in 1854. He was articled to Mr. F. W. Porter, and remained with him after his articles until 1863, when he commenced practice with his brother, Mr. Samuel Clarkson, in London. On the latter's retirement he continued the

partnership with his other brother, Mr. William Clarkson.

In 1878 he was appointed district surveyor of Poplar, a post from which he did not retire until he had attained the age of 75. He was elected associate of the Royal Institute of British Architects in 1869 and a Fellow in 1889, and was made a Fellow of The Surveyors' Institution two years later. He carried out the erection of many important buildings in London of a commercial and municipal character, and was an acknowledged expert in light and air cases. He died at his residence in Highgate, in February last, at the age of 79.

PERCIVALL CURREY (Fellow), whose death occurred on 20th May, had occupied the important position of Honorary Secretary of The Institution for fourteen years, following in office the late Mr. J. W. Penfold, who had acted in that capacity from the foundation of The Institution.

Educated at Eton, and articled to the late Mr. Wyatt, Mr. CURREY entered into partnership with his father, Mr. Henry Currey, F.R.I.B.A., F.S.I., in 1876, and followed him in his extensive and varied practice. He was surveyor to St. Thomas's Hospital, and was responsible for many important additions to that institution, including the new Out-patients Department, the Nurses Home, and the Governors' Hall.

As an architect he devoted himself largely to ecclesiastical work and the design of country houses, erecting churches at Chiswick, Kensington, Eastbourne, &c., and country houses, among other places, at Romsey, Newmarket, and Maidenhead.

As a surveyor he was largely employed in the development of estates, and was particularly successful in

his treatment of considerable building areas at Chiswick, Kensington, and Hunstanton. His services were also in demand as valuer and arbitrator in compensation cases.

Mr. CURREY was elected a Fellow of The Institution in 1889, and of the R.I.B.A. in 1888. In addition to the official position he held in connection with The Institution, he acted also as honorary secretary of the Architects' Benevolent Society.

His son, Lieut. Harold Wynne Currey, at present serving in the Royal Garrison Artillery, had been in partnership with his father for some years, and will carry on the practice.

It is difficult to speak too highly of Mr. CURREY's services to The Institution. During the fourteen years he occupied the position of Hon. Secretary he carried out the difficult duties attaching to that post in a manner which secured the affection and respect of all his colleagues and of The Institution staff. His never-failing courtesy, and his readiness on all occasions to place at the disposal of The Institution his wide experience and ripe judgment, proved of inestimable advantage to the Council, and in particular to the newly appointed Secretary on the retirement of the late Mr. Julian Rogers.

Possessing the good qualities attributed to the best Etonian tradition, he was also endowed with a natural *bonhomie* and tact, which enabled him to strike the *via media* between too close an attention to detail, which might have proved a source of embarrassment to the salaried staff, and a delegation of responsibility which would not have been to the interest of The Institution. During his fourteen years of office, while taking a keen interest in the business of The Institution, his guiding hand made itself felt only when the importance of the

occasion warranted it. His handsome presence and attractive personality have been much missed in the Council chamber since his breakdown in health some six months before his death, and his loss will be intimately felt by a large circle of friends.

CONRAD HUGH DINWIDDY, Major R.G.A. (Fellow), the news of whose death from wounds received in action in France, in September last, was received with great regret by many who were following his career with pleasure and expectation, had been a Member of The Institution since 1902, becoming a Fellow in 1908.

He was 36 years of age, and the fifth son of Mr. Thos. Dinwiddy, F.R.I.B.A., F.S.I., with whom he was in partnership. He took an active interest in The Institution, and was for some years the hon. secretary of the Junior Meetings, of which he was chairman the year before the war. He also devoted himself with characteristic energy to political and municipal matters, was a councillor of Kensington borough, and contested St. Pancras at the last L.C.C. election. His ability in this direction had been recognised by an invitation to stand in the Unionist interest for a metropolitan constituency at the next Parliamentary election.

Major DINWIDDY's many-sidedness was further shown by his improvements in the methods of range-finding in the field, the "Dinwiddy" range-finder for aircraft use being his invention and doubtless to some extent the cause of his exceptionally rapid promotion in the Army.

ARTHUR THOMAS DRAPER (Fellow) died at a nursing home in August last, at the age of 67 years. He was a native of Banbury, and had practised for many

years as a surveyor in partnership with Sir Tudor Walters, M.P., at Leicester. For a great part of this period he was diocesan surveyor to the diocese of Peterborough and honorary surveyor to the Leicester Agricultural Society. In earlier days he was an enthusiastic member of the Volunteers, and rose to the rank of major in the County Battalion.

Mr. DRAPER was a staunch Conservative, and did much work at one time for his party organisation. He joined The Institution as a Professional Associate in 1882, becoming a Fellow two years later.

ARTHUR WILLOUGHBY FRENCH EADE (Fellow), who died in February last, had been a Fellow of The Institution since 1885, and for many years practised as a land agent in the Sunderland and Darlington district, where he had the management of several private estates. He was an M.A. of Cambridge University, and a son of the late Canon Eade of Durham. Although he interested himself in the Northumberland and Durham Committee of The Institution, of which he was chairman in 1904, his retiring disposition did not permit him to take the prominent position in local affairs which his recognised ability would have warranted.

FREDERICK THOMAS GALSWORTHY, who died in November, 1917, at the age of 91, had retired from practice for a number of years, but he was formerly very well known in the profession as an active member of the firm of Messrs. Chinnock, Galsworthy & Chinnock of Waterloo Place, S.W. In 1890 he was elected a Member of the Council of The Institution, and it was with great regret that he felt compelled, from reasons of health, to retire in 1902, when he had attained the position of

Senior Vice-President, and had every prospect of being selected for the highest office.

During his business life Mr. GALSWORTHY identified himself with many activities connected with his profession, particularly those of a charitable nature. Besides being a member of The Institution Benevolent Fund Committee, he was one of the promoters and trustees of the Auctioneers' Benevolent Fund, and for many years acted as surveyor to the Provident Life Association. He also founded the Galsworthy Prize by a generous donation of £500, the interest on which provides annually the prize bearing his name which is given in connection with The Institution examinations.

WILLIAM HOUGHTON (Fellow), who had been a Fellow of The Institution since 1891, died in August last after a very short illness.

For a long period Mr. HOUGHTON, who was 68 years of age at the date of his death, was one of the leading surveyors in the City of London, where he commenced business on his own account in 1877. He served his articles first with Messrs. Harding & Eve, St. Albans, and was subsequently in the office of Messrs. Debenham, Tewson & Farmer. An exceedingly shrewd and far-seeing man of business, he had a most successful career, but as he was primarily connected with trust matters, he did not come prominently under the public eye.

Mr. HOUGHTON had not long before his death been installed Master of the Leathersellers' Company. He was also Verderer of Epping Forest, in which he had taken a great interest for many years.

WILLIAM HENRY HOWATT (Fellow), who was a partner with his father in the firm of Messrs. William

Howatt & Sons, Glasgow, became a Member of The Institution in 1911, and was elected a Fellow in 1912. He succeeded Mr. Fraser as hon. secretary of the Scottish Committee in 1913, a position which he held until he joined the Army in 1916. He was later gazetted sub-lieutenant in the Scottish Rifles, and was shortly afterwards reported missing. Official notification has since been received from the War Office that his death must now be presumed. Mr. HOWATT'S loss to the Scottish Committee will be greatly felt. During his period of office as hon. secretary he had rendered valuable service to The Institution in Scotland, and had secured the respect and affection of the members of the Scottish Committee.

FRANCIS HOLBORROW GLYNN PRICE (Fellow), who was educated at Clifton College and Emmanuel College, Cambridge, began his career as assistant to his father, who had practised as a land and mineral agent and surveyor at Swansea for forty years. He succeeded to the business on the latter's death in 1883, becoming responsible for the management of the Duke of Beaufort's land and mineral estates in Glamorganshire, as well as for other property.

Mr. PRICE was a member of the South Wales Institution of Engineers and a trustee of the Swansea Harbour, also a member of the Board of Guardians for the Swansea Union. He became a Fellow of The Surveyors' Institution in the year 1890, and for some years previous to his death, in July last, had held the responsible position of chairman of the South Wales Provincial Committee.

JOHN TITCOMBE RYDE (Professional Associate),

who was posted as missing from the Bedfordshire Regiment in May, 1917, and who must now be looked upon as killed in action, was the son and grandson of two Presidents of The Institution, Mr. A. L. Ryde and the late Mr. Edward Ryde. He was educated at St. Lawrence College, Ramsgate, and received his professional training in his father's office. He was elected a Professional Associate in 1905, and from the first took an active part in the Junior Meetings of The Institution, being elected chairman in 1913. By his death the profession has lost one who showed promise of following in the steps of his father and grandfather.

CHARLES HERBERT SHOPPEE (Fellow) died in November last at the age of 65. Following the example of his father, Mr. Chas. J. Shoppee, President of The Institution, 1892, he took an active interest in the City of London affairs, becoming a liveryman of the Worshipful Company of Grocers and a freeman of the City. He held the post of surveyor to H.M. Lieutenants of the City of London and to the French Hospital, and was elected a Fellow of The Surveyors' Institution in 1880.

GEORGE PAKENHAM STEWART (Fellow), whose unexpected death in March last deprived The Institution (Irish Branch) of one of its ablest and promising members, was the only son of Captain Edward Pakenham Stewart, a former Fellow of The Institution, and nephew of Mr. George Francis Stewart, Ex-President of The Institution. He was a graduate of Trinity College, Dublin, and served his apprenticeship as a land agent in the firm of Messrs. Stewart & Galbraith, passing the Intermediate and Final Examinations of The Institu-

tion in 1899 and 1901 respectively, and obtaining the Irish Branch's first prize in the latter examination. On the retirement of his father he became sole partner in the firm of Messrs. Stewart & Galbraith, land agents. In 1910 he was elected secretary of the Irish Landowners' Convention, and he was subsequently elected director of the Property Defence Association of Ireland, filling both appointments with conspicuous energy and ability, while still continuing to carry on his land agency business, up to the time of his death.

JOSEPH WALKER (Fellow), whose death occurred at Nottingham in December last at the advanced age of 88, had been a Fellow of The Institution since 1891. Starting life as a farmer, he gained an intimate knowledge of agricultural matters, which stood him in good stead on his going into partnership with Mr. Geo. Williamson as an auctioneer and tenant-right valuer in the sixties. This partnership was dissolved in 1878, Mr. WALKER later starting in business himself in Nottingham, and thus laying the foundation of the present well-known firm of Messrs. Walker, Walton & Hanson.

Mr. WALKER stood in the first rank as an agricultural valuer, and was one of the founders of the Midland Counties Tenant-right Valuers' Association and the Notts Valuers' Association. He also took an active part in the work of The Institution as a member, and past-chairman of the Notts and Lincs Provincial Committee.

JAMES DAWBARN YOUNG (Associate) was born in 1877, the son of Mr. Andrew Young, Member of Council, and was educated at St. Albans Grammar School and London University. Later he entered the office of Mr. John Quilter, F.R.I.B.A., and sat for The

Institution Examinations, being elected a Professional Associate in 1898. He was a regular attendant and speaker at the Junior Meetings, and was a member of their Committee until he gave up the surveyors' profession in 1907 for that of the Bar. He appeared to have every prospect of a brilliant career before him, and his death in April, in the attack on Zeebrugge Mole, although a noble finish to a useful and many-sided life, caused keen regret among the many who were watching his career with interest and confidence.

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Adams, T.	"Town Planning in Canada."
American Institute of Architects	{ "Journal," Feb., 1918.
American Institute of Mining Engineers	{ "Bulletin," 1917-1918.
Auctioneers' and Estate Agents' Institute	{ "The Housing Problem."
Bath and West Southern Counties Society	{ "Journal," Vol. 12, 1917-1918.
British Engineers' Standards Committee	{ "Report," 1917.
British Fire Prevention Committee	{ Red Books.
Duchesne, M. C., F.S.I. ...	{ "British Timber Supplies and the Safety of the Realm."
Farmers' Club	"Journal," 1917-1918.
Institution of Civil Engineers	{ "Minutes of Proceedings," Vols. 202 and 203.
Institution of Civil Engineers of Ireland	{ "Transactions," Vol. 43, 1917.
Institution of Electrical Engineers	{ "Journal," Vol. 56.
Institution of Mechanical Engineers	{ "Proceedings," and List of Members 1917.
Institution of Mining Engineers	{ "Transactions," Vol. 54.
Institution of Municipal and County Engineers	{ "Transactions," Vol. 44.
Land Agents' Society ...	"Journal," No. 15, 1917.

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McCall, B. J. S. J....	Nyassaland Protectorate :—" Report of the Department of Agriculture, 1917."
McCaw, G. T. ...	
Mirams, A. E. ...	" Trigonometrical Survey of Fiji."
Royals Engineers' Institute...	" Indian Industrial Employees."
Royal English Arboricultural Society	" Journal," 1917-1918.
Royal Institute of British Architects	" Quarterly Journal of Forestry," Vol. 12, 1917.
Royal Scottish Arboricultural Society	
Royal Statistical Society ...	" Transactions," 1917-1918.
Secretary to the Board of Agriculture and Fisheries	" Journal," 1917-1918.
Society of Architects ...	" International Review of the Science and Practice of Agriculture," 1917-1918.
South Wales Institute of Engineers	
University of Illinois ...	" International Review of Agricultural Economics," 1917-1918.
	" Journal " and " Year-Book," 1917-1918.
	" Proceedings," Vol. 33, 1917.
	" Bulletin," Vol. 12, 1917.

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